SCIENCE

FEBRUARY 19, 1954

VOLUME 119 NUMBER 3086

AAAS Proceedings Issue

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

The Role of Scientists in the Furtherance of Science[1]

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MY THOUGHTS on this occasion are colored by memories of the first meeting of the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE I attended during the initial term of my graduate study. That, which was my first scientific meeting, was an inspiring experience for which I shall always be grateful to the Association. As a beginner in research, I was stimulated by the contagious enthusiasm of accomplished investigators who told of the experiments they had performed, of their observations, and of the new knowledge they had thus acquired. I well remember an evening in Hart House, at those meetings in Toronto, when I listened on the outer fringe of a small group of physicists who were telling one another of their work and visions, now far exceeded. Then I knew, for certain, that for me there could be no other satisfying life than the life of a scientist, lived in the friendly companionship of scientists. The pinnacle of my desire was the sanctuary of a simple laboratory, with ample time for inquiry and contemplation.

I have seldom known the tranquility I imagined. But thirty restless years since then have been years of rewarding satisfaction that has far exceeded my expectation. I have found that intellectual adventures and the quest for understanding can go forward in times which are not tranquil.

In such periods of rapid change it is well to stress the continuity of science and the values of our heritage from those who were our predecessors. For there is enduring vitality in the purposes and ideals which motivate scientists and enable them to further science under various and changing conditions. But the record of history reminds us that the continued progress of science requires that scientists actively resist adverse social pressures. Continued progress cannot be assumed if we drift unwittingly under unguided forces.

To assure the wholesome development of science, we need from time to time to reconsider its status in our changing culture and to reformulate conditions suitable for the furtherance of science. There is especial need to do so now. Science shapes the lives and thoughts of men and the destiny of nations; many who are not scientists are thus tempted by the will to serve or by the lust for power to control the policies and conditions under which scientists must work. Scientific research and knowledge are essential elements of modern life; the changing patterns of civilization are influenced by and, in turn, have a profound effect on the nature and the course of scientific activity.

This is justification for inclusion of some who are neither scientists nor professional scholars in any field among administrators and trustees who play a powerful role in guiding the affairs of science and its uses. It does not justify their lack of understanding of science and the conditions under which it can flourish. It does not justify the present inadequate representation of scientists on councils that formulate the policies of scientific institutions and determine the destiny of peoples in this scientific age

Two things are needed. Men of affairs and social influence need more knowledge and appreciation of the traditions, ideals, and significance of science. Scientists are in part to blame for such lack of awareness. In the process of education, and in our reports to the public, we have emphasized too much our discoveries and their useful applications. We have inadequately revealed science as a great intellectual adventure. Unless this quality of science is more generally comprehended, we shall be subject to adverse pressures that result from lack of understanding.

Those best able to formulate the policies under which scientists do their research and teaching and make their social contributions are scientists themselves. Accordingly, a second need to which I have referred is for more scientists as trustees of our universities and research institutions and as administrators of governmental and private organizations concerned with science and technology. There is need for more scientists in the higher levels of government.

One of the basic and admirable characteristics of our culture is the traditional willingness of public spirited men and women to give their unselfish service to the furtherance of our free institutions, as trustees of our heritage and our future. So, too, is self-sacrificing service to the affairs of democratic government. If these traditions are to be adapted to the requirements of our present culture, more scientists, engineers, and physicians should be on boards of trustees and in the legislative and executive branches of government.

Schools and universities devote much of their resources to scientific teaching and research. But few scientists are on their governing boards. The men who formulate our laws, and those who administer the affairs of government, deal with the problems of a scientific age. But you will with difficulty find trained scientists or engineers in Congress or in presidential cabinets. I have a high regard for the wisdom of law-

[1] This address was delivered by Dr. Bronk, the Retiring President of the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, at the Annual Meeting, Dec. 1953, at Boston, Mass.

yers, industrialists, and financiers. I have no less regard for the wisdom of countless scientists whom I have been privileged to know. Society needs their participation in its guidance. This they can best do by serving on governing councils, not as mere advisors and correctors of unwise actions.

This role of scientists in the furtherance of science is now of practical importance when the course of science is so largely influenced by financial pressures.

Curiosity and ideas are powerful directive forces in research. But the opportunity to follow our curiosity is limited in some degree by the availability of material resources. This is emphasized by the difficulty of conducting much of modern research in schools and colleges and by the growing dependence of universities on research grants and contracts. If it were our national policy to give available funds to faculties to use as they thought best, we could rely on the curiosity of scientists and scholars to further science. But, while funds come through budget makers, appropriations committees, and fund raisers, the effective development of science requires that policies be determined and executed by scientists who are also men of affairs.

We have an especially significant role to play in the formulation of national policies when authoritarianism and the suppression of inquiry and free discussion are fostered by fear of change. The continuing vigor and vitality of our nation and our sister democracies require courageous leaders who are intellectual adventurers, as scientists must be.

During times of rapid change, which greatly tax men's courage, it is natural that there should be widespread desire for the illusory tranquillity of the past. It is natural in these times of stress that men and women should occasionally grow weary and then regret the sacrifice and effort necessary to sustain the progress of civilization. But the record of the past reveals no time when the spirit of inquiry was secure against the threat of timid, reactionary forces. That spirit was secured by valiant effort and sustained by faith in man's power to grow in dignity and knowledge. In the history of mankind, I find no times of which man can be proud in which men did not use their power to increase their understanding and use newly discovered knowledge to change their way of life. In change there is hope and growth; in security there is only atrophy of the spirit.

As a scientist, I think of intellectual adventure in terms of scientific research and inquiry. As members of the greater community of scholars, we should think of science as encompassing all significant knowledge which enriches life. Science in that broader sense is a great odyssey of the human spirit. Because it is just that, I do not see this age of accelerated science leading to the catastrophic decline of western culture nor to the hobbling of man's spiritual aspirations predicted in the poet's line: "Never glad, confident mornings again." The future I envision is one of glad, confident mornings of new days of greater satisfaction.

I should not have such hopes if science were merely the means of satisfying the material wants of man. My hopes would be still less if the use of science were to secure our present state.

Those who attribute the woes of the present to the rapid advance of science should reread the record of human travail. As Dorothy Stimson, historian of science, says of the days in which modern science began its slow progress three centuries ago: "Wars raged, dictatorships threatened, and people were driven out of their homelands to seek refuge in far countries. Men's personal liberties were at stake. Censorship confronted the daring writer, and Milton was fighting for the freedom of the press. It was a time of violent change."

The violence of those times cannot be charged to scientific progress. Rather, it was the restless urge for change to better ways that fostered the development of science. Unstable ages, such as those and ours, have been the greatest ages in which were formed the salient movements toward human progress.

Progress requires courage. If we are to fulfill our rightful role in the furtherance of science, we need abundant courage. For this we are fitted by tradition and by the nature of our calling, for we are discoverers and teachers of new knowledge which is usually challenged and disputed. And so, there is no place in science for timid men and women who are unwilling to defend their necessary freedom for inquiry and free unprejudiced discussion. The furtherance of science requires courage to withstand the pressure of reactionary forces.

In the traditional spirit of science, the courage of intellectual explorers is tempered with humility. We, who must question the fallible authority of men and man's inadequate formulation of natural laws, have no right to the certainty of arrogant opinions. If we are to fulfill our rightful role as partners in the councils of state and in the guidance of public and private institutions, we shall require the humility that is derived from awareness of our limited competence and knowledge.

Having said what I have said regarding the role of scientists outside their laboratories and classrooms, I would also say that we impede the progress of science by requiring men who are able teachers and investigators to abandon science for administration. The two roles are not incompatible; they need not be inconsistent if we do not make a fetish of administration, as we are prone to do in this country where the administrator is more respected than the scholar.

I have often thought with nostalgia of the Trinity College I knew at Cambridge. It is true there are some administrators hidden away in an obscure building. There is a vice-chancellor who serves as president for a term of years, but he continues to be a creative scholar. The college has a master, but he too is a scholar such as Adrian who succeeded George Trevelyan who followed J. J. Thompson. Much of the administration is assigned to one who is significantly referred to as Junior Bursar. There are committees, but the one I have heard most prized is the one on college

wine which lubricates the flow of sparkling conversation.

And so I was disappointed this past year when I read in the biography of Sir Harold Butler, lifelong civil administrator that he was, this of Oxford, no less than of Cambridge:

> It seems a sad frustration of purpose that the time and effort of so many men capable of higher things should be frittered away on details of organization and finance. The gift of teaching or the capacity for original thinking and research is much less common, and therefore much more precious, than administrative ability. When one finds the same sort of busy absorption in current affairs as is so familiar in the financial world—college meetings, university committees, faculty boards, close schedule of interviews and appointments, colloquies with government departments—one wonders whether the mechanics of university life is not submerging its spirit and obscuring its goal. At moments an uneasy suspicion invades my mind that to some professors university politics and the vast web of interlocking and overlapping bodies, by which the university is over-organized, offers a more attractive field for intellectual enterprise than does the severe discipline of learning. In any case, for most of those caught up in the details of administration there could be little scope for sustained reading, still less for sustained reflection which is a much more exacting enterprise. For them there is little leisure for the contemplative life by which the finest fruits of the spirit are nurtured. The repose, the peace of mind, the freedom from pressing material care seem to have vanished. Until they are recovered, our culture will be the poorer.

I must assume that growing populations and the increase of research, new knowledge, and education create new conditions. But I still believe that scientists can fulfill their broader functions while remaining scholars.

It is customary to think of scientists as only teachers or investigators. There have been many notable exceptions, such as Benjamin Franklin. Research has been for them an essential and a continuing way of life, which they did not permanently abandon while they engaged in other fields of action. Those other duties stimulated their curiosity regarding nature. They enriched the civilization of their times by bringing scientific knowledge and ideals to bear on social problems, as did Franklin when he issued this enlightened communication to the commanders of all armed ships acting by commission from the Congress of the United States at war with Great Britain in 1779:

> Gentlemen, a ship was fitted out from England before the commencement of this war to make discoveries in unknown seas under the conduct of that most celebrated Navigator and Discoverer Captain Cook. That is an undertaking truly laudable in itself because the increase of geographical knowledge facilitates the communication between distant nations and the exchange of useful products and manufactures, extends the arts, and science of other kinds is increased to the benefit of mankind in general. This, then, is to recommend to you that should the said ship fall into your hands, you would not consider her as an enemy, nor suffer any plunder to be made of the effects contained in her, nor obstruct her immediate return to England.

Only a statesman who was a scientist would have written that; only a scientist who was a statesman would have had the opportunity to send that message.

The swift progress of modern science and the complexity of instruments of investigation make it difficult to participate in broader spheres of action. But the intimate interdependence of science and all other phases of modern life requires that scientists accept such obligations. A. V. Hill, our distinguished guest from the British Association, is one who has shown that the assumption of such obligations is not inconsistent with the continuing life of an investigator. Following his brilliant investigations, for which he received the Nobel Prize, he devoted much of his time for ten years to the duties of Secretary of the Royal Society. He was an active member of Parliament during Britain's most trying years. Throughout two wars he played a leading role in her defense. And yet, his lecture last evening was brilliant proof that he is still a creative scholar back in his laboratory with his beloved galvanometers, thermopiles, and muscles.

We need to revise and broaden our concept of a scientist's functions and his role in society. Unless we accept that broader role, our work and we will be controlled by those who do not understand the requirements for the furtherance of science.

One such role that we must play is that of resisting pressure to devote too much effort to research of immediate practical value. I know of no significant distinction between fundamental and practical research. Pasteur's investigation of practical problems revealed knowledge of great fundamental significance. Faraday's fundamental discovery of electromagnetic induction certainly was necessary for the subsequent development of electric power and light and traction. The botanical research of Gregor Mendel, in the garden of a monastery, initiated increased production by modern agriculture. The theories of Willard Gibbs laid the foundation for much of our chemical industry. Their research was of practical value, but, excepting that of Pasteur, it was not undertaken for any obviously practical purpose.

To foster research of immediate practical value at the cost of exploratory research has consequences not unlike the squandering of natural resources. Both impair the welfare of future generations. We who have benefited so richly from the discoveries of our predecessors have an obligation to our successors. As scientists we can fulfill that obligation by pushing forward our explorations on the frontiers of knowledge, for the achievement of material objectives, as did Pasteur, or merely in the quest for knowledge, as did Faraday.

Too great emphasis on research that is of present value has a harmful influence on the education of scientists. It encourages training for immediate useful service at the expense of education which is a foundation for continued intellectual growth and ulti-

mate competence to solve unanticipated problems of the future. It fosters undue specialization.

If those who support science think the goal of science to be quick answers to practical questions, scientists will be trained for limited objectives. As society accepts the responsibility for supporting more scientists, more men and women will be recruited who are content to fit themselves for a small sphere of scientific action. There is useful work for them to do, and organized research will undoubtedly increase their usefulness. But if the quality of scientific training is determined by the needs of those who are content to be mere technicians, those who would be more will suffer.

Now that science is no longer in its simpler childhood, it may be too much to hope that many can encompass the range of attributes attributed to Newton by Einstein when he wrote: "Fortunate Newton, happy childhood of science. . . . In one person he combined the experimenter, the theorist, the mechanic, and, not least, the artist in exposition." Despite the growth of science, we can resist the pressures of mass education, organized research, and the economic lures and limitations of quick achievements.

In these times, when modern science gives to selfish few the power to control the thoughts and lives of many, there is need for vigorous emphasis on scientific inquiry as an intellectual adventure of those with unsuppressed curiosity.

Those who have done most to further science did not cultivate a fugitive and cloistered virtue. They were partners of many others in a great undertaking in which they used intellectual inquiry as a powerful means for promoting the growth of man's spirit. They did not abandon inquiry because the consequence of inquiry and research is change.

To wonder and to wander lead upward in the trend of life. When man ceases to wonder and to wander from necessity or choice, he ceases to ascend in the scale of living beings. Physical wandering is still important, but as the geographical frontiers are passed the value of man's spiritual adventures increases: adventures of thought, adventures of emotion, adventures of aesthetic experience. The desire for security and the suppression of curiosity inhibit the intellectual and spiritual development of man.

When science seemed less important, scientists were freer to do as they wished to do. Nowadays, there are many who are willing to support science, provided they can organize and direct scientists' activities—about which they know but little.

The continued progress of science requires that scientists interpret to those who are not scientists, their potential contributions and the nature of their competence and limitations. To secure those conditions in which scientists can most effectively pursue their search for truth demands that we vividly define our motives and objectives.

Many of the most important discoveries of scientific research have come from intellectual adventures of individual scientists. No one directed Newton to discover the laws of gravitation. No one organized Faraday's discoveries in electricity for the benefit of the modern electric age. No one suggested to Roentgen that he discover x-rays for the diagnosis of human ills. No one instructed Niels Bohr to pave the way for the production of atomic energy. Many scientific discoveries will continue to elude direction and organization as surely as would the creation of great music or poetry, or sculpture or art. Much of scientific research is exploration of the unknown and I, for one, do not believe that it is possible to direct the course of an explorer through unexplored territory.

Scientists have a second purpose. It is their desire to bring order out of chaos. Curiosity lures scientists to the search for new knowledge through observation and experiment. The wish to relate facts and fit them into a consistent pattern is the motive which causes them to formulate natural laws and the concepts that make scientific facts meaningful and usable.

Those who suddenly comprehend the relations of previously unrelated facts, and thus see their relevance, experience a deep esthetic satisfaction. It is in that phase of scientific endeavor that facts and observations are formed into the structure of knowledge, which is the foundation for further discoveries. This is the role of the scientist's creative imagination. Without freedom and leisure for the play of his imagination, a scientist becomes only a fact gatherer, dealing with the bare bones of science, unarticulated and unclothed with the flesh of meaning.

This subtle process, from which so much of human value comes, has been described with rare insight by John Livingstone Lowes in *The Road to Xanadu*. In that study of the ways of poetic creation there are these passages:

"The ways of the creative process are not the monopoly of poetry. In the field of science, too, the imagination draws the immense confusion of phenomena within the unfolding conception of an ordered universe.

"For years, through intense and unremitting observation, Darwin had been accumulating masses of facts which pointed to a momentous conclusion. But they pointed through a maze of baffling inconsistencies. Then, all at once a flash of vision came. Only then, and not before, could he slowly frame the great statement of the theory of evolution," which has reshaped men's thoughts.

Considering the work of Newton, Lowes goes on to say: "The leap of the imagination from the fall of an apple in the garden at Woolsthorpe to an architectonic conception, cosmic in its scope and grandeur, is one of the dramatic moments in the history of human thought. But in that pregnant moment there flashed together the profound and daring observations and conjectures of a long period of years; upon the instant of illumination followed other years of rigorous and protracted labor before the *Principia* appeared."

Thus to bring order out of chaos and attain understanding is one of the great roles of the scientist. As we plan our new age of science we shall do well to preserve an environment in which this purpose will be

nurtured, despite the urgency of present needs. For it is unlikely that the scientist's imagination will often leap to a specified goal. A chaos of facts will seldom fall into an ordered, predetermined pattern useful for a certain end.

Our colleges and universities have long provided a congenial atmosphere for the furtherance of science. They are best suited to integrate all fields of knowledge and to nurture free inquiry and speech. Their faculties inspire and educate our successors in an atmosphere of intellectual adventure. But this will cease to be so if lack of funds limits teachers to the teaching of science that is carried forward in wealthier laboratories outside our educational institutions. Universities will be deflected from the fulfillment of their proper functions if they are required to earn a hand to mouth existence by doing the odd jobs of science.

If universities are to fulfill their vital mission in modern society, they require greater freedom in the use of funds for the work of scientists who cannot honestly define detailed projects because they are explorers on the unexplored frontiers of science. They require more support of men and less of projects favored by administrators who are unversed in science. They need no less support of science, but more support of other scholars who are partners of scientists in the advancement of knowledge. It should be more generally recognized that the faculties of universities are best able to plan the balanced development of their scholarly activities without direction from others. At a time when vast resources are needed for research that can no longer be performed by individual scientists, universities need to be fortified in their primary devotion to the intellectual development of men. Only thus will the future of science be assured.

Scientists will best fulfill their role in universities if they focus their efforts on the cultivation of the bold adventurous spirit which scientists share with all others who foster lives worth living.

This was expressed in cogent words by the distinguished predecessor of Earl Steve·on who is our distinguished host on this occasion Said Arthur D. Little: "Ours is the duty and the privilege of bringing home to every man the wonders, the significance, and the underlying harmony of the world in which we live to the end that all undertakings may be better ordered, all lives enriched, all spirits fortified."

This great Association of scholars has a rich heritage from the inquiring minds of those who had the spirit of adventurers and the courage to defend their freedom to seek and state the truth. It is our high mission to preserve that freedom for those who will follow us in the furtherance of science.

The Duty of Dissent[1]

E. U. Condon

Corning Glass Works, Corning, New York

YESTERDAY noon I happened to turn on the television set and there was a sidewalk interview going on with my former boss, Harry Truman. He was asked "Do you think that our basic freedoms are being threatened?" To this the former President replied, "They are being threatened, but they are not in danger!" That remark did my spirits a lot of good, depressed as they occasionally are by the rubbish that is being peddled so violently and vociferously these days.

We hear a lot of talk these days about our freedoms and our liberties, which, as former President Truman opines, are being threatened but are not in danger. Occasionally a voice is raised to remind us that liberties and freedoms imply duties and responsibilities. Usually before long it turns out that the writer or speaker is weaving a neat little argument to prove that the duties and responsibilities take the form of pressures toward conformity, and thus act as curbs on the liberties and freedoms.

What I want to express briefly is that conformity, in the sense of uncritical adherence to some established doctrine, is a deadening thing to the scientific and intellectual growth on which progress depends. This being so, we have not merely the freedom and privilege of critical examination of the ideas and facts and interpretations put before us for our acceptance, we have a positive duty to exercise that privilege by active use of our critical faculties, a duty without the exercise of which we cannot be said to have discharged the responsibilities of democratic citizenship.

It is this attitude toward new data and new conclusions that we find well developed in scientific research at its best. It is this attitude that is often so sadly lacking in the politician's approach to social problems, and that is so sorely needed there, even though its use in the political field is so much more difficult because of the emotional connotations of many social problems. It is, I am convinced, the lack of this attitude in handling political problems which, more than anything, retards progress in this field.

[1] At a luncheon meeting Dec. 28, 1953, on the occasion of the presentation of the AAAS-George Westinghouse Science Writing Awards, Dr. Condon, as president of the AAAS, made the principal address from which this is taken. Parts dealing with personal reminiscences of his days as a newspaper reporter in California, 1918–1921, have been omitted.

This point is not as well understood as it should be. I think the science writers understand it pretty well for they are the kind who have a natural inclination toward scientific method. But here at this convention I have talked with several of the working press of Boston who do not ordinarily deal with science. The kind of political misbehavior that is being overdignified these days by calling it anti-intellectualism, and which really represents nazi-type pressures against independent thinking and toward conformity to authoritarian doctrines, seemed to be very much on their minds.

Several of these men seemed vaguely to have the idea that the tendency of the scientists toward independent critical thought is just a kind of unruliness or bad-boy-ism which we perhaps have to tolerate in these eccentric fellows because they are the geese that lay the hydrogen bombs as well as many other great and good things.

When I encounter men who think this way, I labor earnestly with them, trying to get them to see that these are not just little adventitious oddities of the scientific homunculus. I try to get them to see the point I am trying to make here, that the critical questioning attitude is an essential ingredient of the scientists' method of working. Without it the method does not work.

I first came sharply up against this misunderstanding in a hearing before a governmental loyalty board five years ago—a really rich experience if I ever had one. The board chairman was a tired old civil servant without the slightest notion of what science is all about. He was turning over some notes he had made from certain raw, unevaluated files, and finally said to me in an accusingly questioning way: "Dr. Condon, we understand that at times you have been critical of the older ideas in physics!" At first I thought my leg was being pulled, but then I caught a glimpse of the sustained humorlessness of these tiresome proceedings, so I replied by making a stirring affirmation of faith in the truth of Archimedes' principle and of Newton's law of gravitation. This seemed to satisfy the board, for I was not asked to take sides on the matter that brought Galileo before the Inquisition.

Clearly it would have been hopeless with those people on that occasion to try to make the point I am trying to make here, on the duty of dissent. I hope that here it is not hopeless or even necessary.

I think that it is interesting and instructive to observe the degree to which people have a critical questioning attitude, or conversely have an uncritical conformist viewpoint. For example, it is instructive to consider in this light young Americans who have for a time been in some degree associated with the Communists. There are some who showed an interest in the mid-thirties, and I think it is a sign of a good inquiring mind that they did so. I respect them for it more than some of those who never had a lively enough spirit of inquiry to do so. Then they soon became acquainted with the rigid authoritarian boundaries of its doctrine, and pushed it away from themselves as a thing of no value, and I respect them for this, too.

But then there is another type of ex-Communist who never as a Communist had an inquiring or critical mind but who, until they happened to be disillusioned, followed the comrades in blind faith. Then, in a wild emotional reaction, they leaped from slavish adherence to the Communist dogma to an equally violent and passionately slavish adherence to an authoritarian anti-Communism. It is these people who are doing so much harm in America today as they eagerly play the game of the elements in Congress—who have shown that they have little respect for American principles of freedom and fair play.

In my opinion, the most important contribution science is making, and has yet to make, to human welfare is the inculcation of the scientific attitude of objective critical analysis of complicated situations and of the ability to reserve judgment until the facts are in. This is not a passive attitude but an active one, requiring honesty and fairness, combined with the eagerness and activity shown by a good newspaperman on the trail of a story.

I think it is in this actively questioning attitude that scientists and newspapermen have most in common. We have similar ideals and, since we are all human, we have similar shortcomings and inadequacies. It is again a happy occasion on which scientists through the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE can honor a group of science writers who have been outstandingly successful in interpreting science to the public, and through them can honor the newspapers and periodicals with which they are associated.

Editor's Note: Indicative of the difficulties of comment on a subject highly charged with political emotion is the fact that, in reporting the foregoing remarks, one Boston newspaper took the third from the last paragraph out of context and gave it a front page headline reading "Condon Lauds Pro-Reds;" and a rather misleading account was sent out on one of the wire services, although the Associated Press report was as accurate as a brief report can be.

In amplification of this part of his talk, Dr. Condon has written to *Science* as follows:

> Perhaps I did not make my position clear, but I was protesting against the un-American tendency in some quarters to accept almost as national heroes some ex-Communists who were ardent full-time professional devotees of the Communist conspiracy against American democracy in the thirties, while at the same time some young scientists, whose only association with the same conspiracy was that of short-time slight participation in campus study groups in college, have been hounded and harassed from their jobs, and their professional careers ruined, even, in some cases, after a loyal and devoted period of distinguished service in military research during and since the war. We have laws and judicial procedures which are an adequate protection against espionage, sabotage, security leaks or conspiracies to overthrow the government. It is an outrageous thing that we allow unscrupulous politicians to present falsified accounts of these matters to the public at the expense of individuals who have served their country well and whose services today are needed.

George W. Beadle

Curt Stern

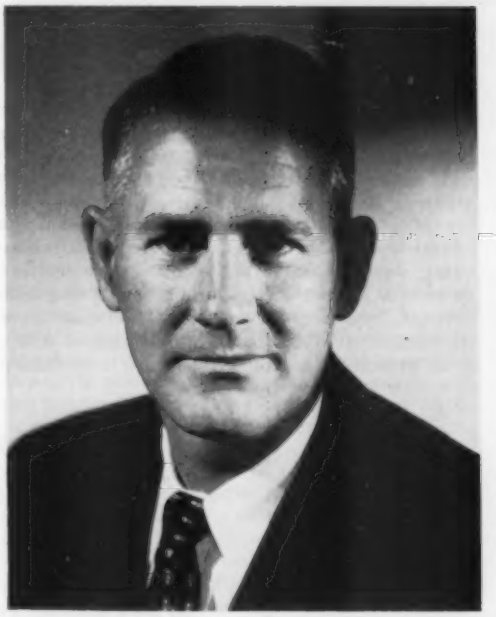
University of California, Berkeley

DURING the last 20 years the mean age of president-elect of the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE has been 60.4 years. George W. Beadle, the president-elect for 1954, is ten years younger than the average, close to the left-hand end of the range. It is gratifying to all scientists to be represented by a leader who is still so near the young generation that they can admiringly claim him as one of their own.

George Beadle has attained his eminence with the help of an unusual flexibility of mind. Trained in the field of agronomy in the University of his native state, Nebraska, and obtaining there both the bachelor's and master's degrees, he continued his graduate education in the Department of Plant Breeding at Cornell University. Here Beadle joined the school of geneticists who, under the wise guidance of R. A. Emerson, were making *Zea mays*, the Indian corn, genetically the best known plant. At Cornell, in the Department of Botany, L. W. Sharp and L. F. Randolph provided instruction in the cytological approach to genetic problems, and Barbara McClintock had just entered upon her career as the foremost cytogeneticist of our times. In this favorable scientific climate and within a few years, Beadle made fundamental contributions to the understanding of inherited sterility phenomena in plants. He recognized the varied chromosomal nature of different cases of sterility in corn. A series of papers on Mendelian asynapsis, on a gene for supernumerary cell divisions in cells normally destined to form pollen or ovules, on a gene for failure of cytokinesis during meiosis, and on a gene for sticky chromosomes are records of important discoveries in a strategic region, that of chromosome behavior, particularly in meiosis. Some of these studies were completed at Cornell University, which awarded Beadle his Ph.D. degree. Others he took with him, under a National Research Council Fellowship, to the Laboratories of the Biological Sciences, California Institute of Technology.

At Pasadena, Beadle soon turned his interest to an organism that had been developed into the most penetrating tool for the probing of chromosomal genetics, *Drosophila*. For three years intricate analyses were made of basic phenomena in the process of crossing-over, the exchange of sections between homologous chromosomes. This second period of research was terminated by a fundamental publication, jointly with A. H. Sturtevant, which contained a surprising solution of long extant problems of crossing-over in cells with inverted gene sequences in their chromosomes.

At this time Beadle left the classical field of chromosomal genetics to turn to developmental problems. During a stay in Paris together with B. Ephrussi he devised a method of transplantation of drosophila tissues from one larva to another that has become a much



used tool in physiologic genetic investigations. The problem to which Beadle applied his technic was that of the determination of eye color. Many genes were known whose action results in different pigmentation of the adult drosophila eye. What is the biochemical sequence of events which leads to the specific pigmentation, and where do given genes exert their influence on this sequence? The answer, obtained in collaboration with E. L. Tatum at Stanford University, where Beadle, after a year at Harvard, had become by now a staff member, consisted in the discovery of a number of successive steps in the biosynthesis of the eye pigments and in the basic concept that individual steps are controlled by individual genes.

The actual recognition of the different substances involved in this chain of reactions proved to be a very difficult undertaking. It was at this point in his career that Beadle with Tatum took the courageous step of calling a halt to their successful exploration of the genetic-biochemical determination of the eye colors of *Drosophila* and to begin work with a completely different kind of organism, the bread mould *Neurospora*. Drosophila genetics had supplied the genes but had failed to give easy access to the biochemical substances. The new project envisaged to begin with well-defined biochemical materials and to create the genes that would control their synthesis and transformation. In

1941 a short paper on "Genetic control of biochemical reactions in *Neurospora*" described the ingenious method designed to obtain biochemical mutants, and gave the first examples of such genes, in this case concerned with the synthesis of vitamin B_6 and other growth factors. The foundation had been laid for the many important discoveries of the neurospora group of biochemical geneticists.

George Beadle's accomplishments are his own yet they are shared with those of others. His wide knowledge is continually outgrown by his widening interests. To keep pace with them he has had to increase his knowledge still more, by learning and by association with experts in other fields. Everyone has been the gainer in these joint undertakings. Thus Beadle is a symbol not only of the outstanding discoverer but also of that type of modern scientist who succeeds in combining separate branches of knowledge in his own person and in the teamwork of a group of men from different disciplines. The temporary specializations of the sciences, so often decried by shortsighted critics, in the presence of men like Beadle lead to unification on a more comprehensive level.

Beadle has not shirked from presenting and interpreting the new aspects of genetics to wider audiences. His Sigma Xi National Lectureship and his addresses to many groups of chemists, at general symposia and diverse occasions, have brought to his listeners the pleasure of reliving the experiences of the researcher. As president of the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, he will more prominently than ever continue to represent science to the American public.

Since 1946 Beadle has been chairman of the Division of Biology of the California Institute of Technology. His service in providing the best working opportunities for one of the largest and most original group of investigators bears witness to his unusual ability as an organizer. Many governmental agencies and other bodies also constantly make use of Beadle's skill in solving the problems of the organization of science and of research. With a clear head he sees the essentially simple facts even in a complex situation; and, seemingly without effort, order is created. The AAAS can be congratulated upon having secured for itself the many-sided gifts which George W. Beadle brings to his tasks.

Dael Wolfle

Walter S. Hunter

Brown University, Providence, Rhode Island

PERHAPS because I am a psychologist and a member of the Board of Directors of the AAAS, I have been asked to introduce to the membership Dr. Dael Wolfle, the newly elected Administrative Secretary. Perhaps the real reason was that, over the past ten years, I have at times been closely associated with Wolfle in the administration of large research programs and in advisory capacities to governmental agencies where there has been an excellent opportunity to note the soundness and wisdom of his judgments as well as the calmness and good sense with which he met critical issues as they arose. The Association is indeed to be congratulated that the Administrative Office is to be under the leadership that he can provide.

Wolfle's father was brought to this country from Germany when still a baby, and he grew up in an isolated farming community with little English and little opportunity until a visiting teacher got him started toward a college education. The University of Washington granted him the bachelor's and master's degrees in physics and an instructorship, after which he turned to public school teaching. When he died in 1952 he had taught and administered in the public schools longer than anyone else in the State of Washington.

Initially Dael started in his father's footsteps, majoring in physics and mathematics and receiving his bachelor's and master's degrees from the University of Washington (1927 and 1928). An offer in psychology from Ohio State University led him to shift his interest to that field and he earned the doctor's degree at Ohio State in 1931. After one year as an instructor there, he was appointed professor of psychology at the University of Mississippi where, at the age of 26, he was by far the youngest professor on the campus. That he was successful is beyond doubt since he remained for four years, building up a fine small department. In 1936, he left Mississippi to become the Examiner in the Biological Sciences at the University of Chicago. This position not only developed his expertness in the field of tests and measurements; it brought him into contact with outstanding biologists and further developed his know-how in dealing with people. Three years of such an experience led to his appointment in the psychology department at Chicago.

And then came the War. For two years Wolfle was Civilian Administrator for the Signal Corps in the Ninth Corps area. Here he was concerned with curriculum development and the selection of students for the various schools in telephone, radio, and radar

from the vocational to the graduate level. When the Applied Psychology Panel, NDRC, was organized in 1943, Wolfle's reputation had grown so far that he was enthusiastically chosen both as a member of the Panel and as a Technical Aide to the Chief. Until 1946 he served his country and science with great effectiveness in the administration of research projects in the field of selection and training and in liaison with various military commands, receiving at the end a Presidential Award of Merit. An OSRD report which he prepared on the use and design of synthetic trainers had a marked influence in the development of human engineering in the military services.

In 1946 Wolfle accepted the secretaryship of the American Psychological Association, which position he held for five years. During this period the APA membership exceeded 7000, and ten scientific journals were being published. It was Wolfle's task to handle the many administrative and financial details of this organization while directing the professional expansion of psychology and maintaining consultantship contacts with such organizations as the Research and Development Board, the Air Force Scientific Advisory Board, and the National Science Foundation.

Since 1950 he has been the Director of the Commission on Human Resources and Advanced Training appointed by the Conference Board of Associated Research Councils. The Commission has now in press a volume covering the supply, the probable future demand, and the potential supply of people qualified for work in science, engineering, the professions, and other high level fields. As the Commission's work comes to a close, Wolfle will shift gradually to full time with the AAAS.

The foregoing chronicle does not do complete justice to the new Administrative Secretary. It makes no mention of his excellent publications in the field of experimental and comparative psychology. It makes no mention of the fact that he is a devoted family man. His wife Helen M. Wolfle, also a doctor in psychology, is the author of some very important research publications and a woman of wide administrative experience in science. But especially the account fails, as any account must fail, to present the kindly, gentle but incisive personality of the 48-year-old scientist who is the new Administrative Secretary of the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. Only personal contacts will adequately reveal this side of the man. The membership can look forward confidently to his administration of its affairs.

Paul A. Scherer

Lee Anna Embrey

National Science Foundation, Washington, D.C.

INVENTOR, engineer, administrator, and gentleman farmer, Paul A. Scherer, executive officer of the Carnegie Institution of Washington, manages to crowd several careers into one busy work week.

He was born in Zanesville, Ohio, July 25, 1897, the son of James A. B. and Bessie Scherer. Like so many of his scientific colleagues, he is the son of a minister. His father, who was ordained at the age of eighteen, was pastor of a Lutheran church in Charleston, South Carolina, where Paul spent part of his childhood. Dr. Scherer was subsequently president of Newberry College in South Carolina and later of Throop College in California.

Young Scherer developed an early taste for physics and engineering and began his studies at the California Institute of Technology. His college career was

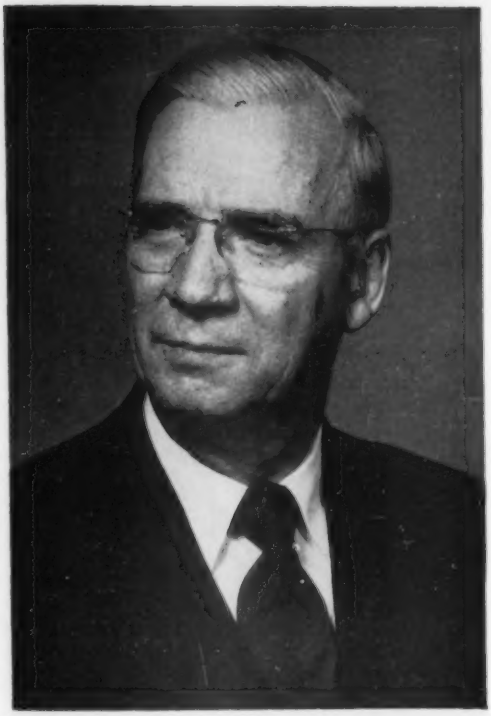
interrupted by World War I. In his zeal to see immediate military service, he attempted to enlist in the Canadian Army but was finally persuaded that he could be more useful in the American Navy. He enlisted as a seaman but his aptitude for naval life led to his being assigned to Annapolis to take the officers' short training course. In his preparation for a commission, he was able to continue his interest in engineering, and upon completion of the course, with an ensign's commission, he was assigned to sea duty as an engineer officer. He returned from the war with a rank of lieutenant senior grade.

His marriage to Margaret Hale on Christmas Day, 1918, brought together two distinguished American academic families. Miss Hale's father was the noted astronomer, Dr. George Ellery Hale, organizer, and for many years director of the Mount Wilson Observatory under the Carnegie Institution of Washington. Dr. Hale and Dr. Scherer met on shipboard enroute to Skibo, Scotland. Each hoped to interest the late Andrew Carnegie in giving funds to their respective institutions. Dr. Hale, keenly interested in Throop College, persuaded Paul Scherer's father to accept the presidency of the college, which later became the California Institute of Technology.

Upon the termination of Mr. Scherer's military service, the Scherers decided to move to Oregon and go into the fruit-growing business. This appears to have been one of those significant decisions that have so profound an effect upon later careers, because it was as a fruit grower that Mr. Scherer first became interested in refrigeration problems. Dissatisfied with the precooling devices in the pear-packing plants, he began to develop his own methods and equipment for more satisfactory refrigeration. Mr. Scherer holds a number of patents in the field of refrigeration. These interests later led him quite naturally into the field of air conditioning.

After several years of managing fruit companies in the Northwest, he became a consulting engineer in the field of heat transfer and refrigeration. Just before the outbreak of World War II he served as consultant in the design and construction of the Dallas plant of North American Aviation. In the early years of the war he was director of research for the AiResearch Manufacturing Company of Los Angeles, working on heat transfer problems for aircraft and developing equipment used on heavy bombers and fighters. At AiResearch he was also in charge of early production models of that company's all-aluminum Intercooler—a device that raises the critical altitude of American bomber and fighter planes by cooling the hot air from the supercharger before it reaches the motor.

About this time the National Defense Research Committee of the Office of Scientific Research and Development was looking for a man to head its new Engineering and Transition Office, an office which had been set up to transform successful research projects into production models suitable for service testing and mass production. Mr. Scherer was recommended as a man peculiarly qualified for this difficult and



vital task. To him belongs a substantial share of the credit for the speed with which the weapons and devices developed under the OSRD research program went into production and use.

After the close of the war, Mr. Scherer remained with the OSRD to assist in the multiple details associated with the termination of a Federal agency. At about this time the post of executive officer of the Carnegie Institution of Washington became vacant through the retirement of the late Walter M. Gilbert, and Mr. Scherer was a natural choice as his successor. The war years had fully demonstrated his talents and abilities to the director of the OSRD, Dr. Vannevar Bush, who was also president of the Carnegie Institution. They worked together especially well because of their common interest in engineering problems. Dr. Bush says of his principal staff officer:

> Blessed is the president of anything whatever who has with him a good executive officer. Really accomplished executive officers are far more rare than good presidents or good commanders. Theirs is a subtle art which few indeed grasp and fewer practice. Paul A. Scherer is the best practitioner of the art I have ever encountered.

As executive officer of C.I.W., Mr. Scherer is responsible for many details of a scientific activity whose influence is world-wide in scope. The Institu-

tion maintains seven research departments: the Mount Wilson and Palomar Observatories (in collaboration with the California Institute of Technology), the Geophysical Laboratory, the Department of Terrestrial Magnetism, Department of Plant Biology, Department of Embryology, Department of Genetics, and the Department of Archaeology.

Mr. Scherer takes the load off the president in the administration of this widespread operation and in addition shares many of Dr. Bush's scientific and inventive enterprises. At present he spends some of his time on the chilly waters of Chesapeake Bay experimenting with the hydrofoil craft that Dr. Bush and he have developed.

A hydrofoil craft is one that operates on foils or wings submerged below the surface of the water. The hull is attached to the foils by struts and rides above the surface of the water unaffected by wave action. Such a craft has many advantages, including greater stability and speed than conventional displacement craft, and a high degree of invulnerability to mines and torpedoes. Hydrofoil craft with surface-piercing hydrofoils are old—Alexander Graham Bell built a good one about 1920. But stable submerged hydrofoil craft are new. Dr. Bush and Mr. Scherer have made a number of inventions in the hydrofoil field, particularly with respect to stability and control, problems which in the past have limited the development of hydrofoil craft.

The Scherers make their home at Marietta, one of Maryland's famous old colonial homes, built around 1780 by Gabriel Duval, Associate Justice of the Supreme Court. It is thrown open to the public once a year, as part of Maryland's annual garden tour.

The Scherers have six daughters and twelve grandchildren.

News and Notes

Conference on the Validation of Scientific Theories, Boston, Dec. 27-30

DESPITE the immense technological successes of science in our time, there has been a widespread dissatisfaction. One has accused modern science for its emphasis on the material aspect of the world and for diverting the mind of modern man from human and spiritual interests. The humanities have developed almost segregated from the sciences. Philosophy, the key to the humanities, has become an isolated department, without much bearing upon the mind of present-day scientists. By the present Conference, an attempt was made for some improvement of this unsatisfactory situation by discussing in a strictly scientific way possible bridges between the natural and the social sciences, between the sciences and the humanities. Such bridges cannot be built without some elements of a common language and without a minimum of common philosophy.

The Conference was sponsored by the American Academy of Arts and Sciences in Boston, the Institute for the Unity of Science, and the National Science Foundation. The program committee consisted of Ph. Frank (Harvard) as chairman, H. Feigl (Minnesota), G. Holton (Harvard), H. Margenau (Yale), R. K. Merton (Columbia), R. J. Seeger (National Science Foundation), and R. H. Shryock (Johns Hopkins). The committee chose as the central problem of the Conference the "Reasons for the acceptance of scientific theories" because, in the solution of this problem, not only results of purely scientific research are involved, but equally considerations from the fields of social studies and the humanities, particularly from the philosophy of science.

In Symposium A (a joint session with AAAS Section L and the Philosophy of Science Association; R. J. Seeger, chairman) this central problem was formulated and the variety of its solutions outlined. *Ph. Frank* stressed the point that in the physical sciences a general theory, as the theory of relativity, is not accepted on the ground of mere agreement of its results with observed facts. The theory should also be "simple," in agreement with common sense, with prevailing philosophies and should allow an interpretation of the universe that can be used to support a "desirable" way of life. Since none of these requests can be completely met by a theory, the actual acceptance has always been the effect of a compromise. *W. Churchman* (Case Institute of Technology) showed by a logically elaborate argument that "inductive inference," the derivation of general theories from observed facts, includes always decisions that are not essentially different from "moral" decisions. *B. Moore* (Harvard) exemplified the role of a "desirable" way of life as a motive for the acceptance of theories by describing the effects of government action in the Soviet Union upon the presentation of scientific theories in writing and teaching. In the discussion, *E. Nagel* (Columbia), *E. C. Kemble* (Harvard), and *R. Rudner* (Tufts) elaborated on the logical and sociological aspect of theories.

Symposium B (*H. Margenau*, chairman) was devoted to the requirement that every theory should have an "operational meaning." *G. Bergmann* (Iowa) and *C. Hempel* (Yale) presented blueprints for a logical analysis of this concept. *R. B. Lindsay* (Brown) pointed out that theories that are actually used by the physicist contain some terms without operational meaning and asked *P. W. Bridgman* (Harvard) to comment on this fact. In the discussion, Bridgman described his personal part in the fight for "operational analysis;" it is necessary that a theory as a whole have operational meaning, but this is not necessary for each single term. *R. J. Seeger* and *S. S. Stevens* (Harvard) directed attention to some points in the

concept of "operational meaning" that need further elucidation.

Symposium C (*H. Feigl*, chairman) was devoted to psychoanalysis, a doctrine that has gained great practical importance although opinions about its precise status within the domain of the sciences have been divided. *Elsa Frenkel-Brunswik* (Berkeley) made a strong plea for the view that psychoanalysis is a science in the same sense as physics or biology; auxiliary concepts like "super-ego" or "libido" without direct operational meaning have the same logical status as "electron" or "neutron" in physics. *F. Skinner* (Harvard), however, pointed out that these psychoanalytical terms are rather harmful fictions that prevent us from grasping the correlations in the observable behavior of human beings. *J. Richfield* (Cincinnati) spoke from the viewpoint of a practicing psychoanalyst about the relation between theory and practice in this field. In the discussion *M. Lean* (Brooklyn College) and *M. Scriven* (Minnesota) commented on the problem from a philosophical angle, and *S. Margolin* (New York City) pointed at physiologican phenomena that could be interpreted as correlated with the subconscious.

The great variety of the criterions that are responsible for the acceptance of a theory becomes very clear if we turn to a very general theory. An example was discussed in Symposium D. To put the question bluntly, we ask: Is the human organism a machine? The problem was discussed by *W. Koehler* (Swarthmore) on the basis of his philosophy of physical and biological science, by *N. Rashevsky* (Chicago) as a biophysicist, and by *W. McCulloch* (MIT) on the basis of contemporary giant computation machines and the theory of feedback mechanisms (cybernetics). All speakers agreed that the conception of "machine" has lost its ancient simplicity and that the question should not be whether our organism *is* a machine, but whether the machine-theory is useful for the advance of our knowledge about organisms. It has developed that a great many features of organisms can be imitated by machines, but it is doubtful whether an organism as a whole can be duplicated by one single machine. *B. Mandelbrot* (Paris) spoke about laws of human speech that can be derived from a machine-theory.

Symposium E on "Science as a social phenomenon" (chairman, *G. Holton*) took up, in a more specific way, the topic of A. Three speakers presented examples of how the advance of science has been influenced by social factors. *H. Guerlac* (Cornell) discussed the favorable and unfavorable impact of the French Revolution upon the advance of science. *E. Boring* (Harvard) presented his views about how the climate of opinion of a period ("Zeitgeist") exerts a positive or negative influence upon scientific creativity. *A. Koyre* (Sorbonne) stressed the bearing of philosophical doctrines upon scientific theories, using as example doctrines that teach or reject the finiteness of space. In the discussion, *B. Barber* (Barnard), *K. Deutsch* (MIT), *R. S. Cohen* (Wesleyan), and *J. S. Bruner* (Harvard) stressed the necessity for more detailed and systematic research about the mutual interaction between the rise of scientific theories and social factors.

Symposium F (a joint session with AAAS Section K1; *P. W. Bridgman*, chairman) was devoted to the discussion of the attempts that have been made by *J. Q. Stewart* (Princeton) and his group to apply mathematical formulas directly to social phenomena by using analogies between physical and social laws.

PHILIPP FRANK

Harvard University

Science News

A new element, of atomic number 99, has been produced and identified at the Radiation Laboratory of the University of California. By bombarding uranium 238 with stripped nitrogen atoms at 100 million electron volts, the uranium atom was made to take up, in one step, the seven protons necessary to change uranium 92 into the new atom. At the same time there were added to the uranium atom enough elementary particles from the excited nitrogen to give the new element an atomic mass of 247, making it to date the heaviest atom on earth.

In three experiments a total of only 40 atoms of the element have so far been detected. These have resulted from experiments, not yet declassified, at Argonne National Laboratory, at Los Alamos, and at the University of California. Detection of the new element and measurements of its rate of radioactive decay were reported in the Jan. 1 issue of the *Physical Review* by Albert Ghiorso, Bernard Rossi, Bernard G. Harvey, and Stanley Thompson.

Atomic energy has been converted directly into electricity through a revolutionary **"atomic battery,"** using a waste product of atomic reactors. The waste product is strontium 90, which emits high-speed electrons that bombard pea-sized transistors. The transistors, themselves revolutionary in the field of electronics, in turn emit 200,000 slow-moving electrons for each high-speed electron striking the material from the strontium 90. This creation of electric current is strong enough to produce an audible tone in a telephone receiver.

The new Radio Corporation of America battery is the size of a thimble and has a life expectancy of 20 years. It is a climax to 40 years of scientific efforts aimed at converting the radiation of the atom's nucleus directly into electricity.

Tools used by a previously unknown people who lived in the Old Stone Age just after the days of Neanderthal Man were among the finds made in Shanidar Cave in northern Iraq by Ralph S. Solecki of the Smithsonian Institution. Dr. Solecki has named the people the **Baradost Culture** after the mountain in which the cave is located. Evidence of the people was found in the same cave in which Dr. Solecki discovered the bones of a 75,000-year-old baby last summer. The

Baradost people lived some time after the Old Stone Age child.

Shanidar Cave was recently visited by Dorothy A. E. Garrod, eminent archaeologist formerly of Cambridge University, England. Dr. Garrod, who has herself made excavations nearby in Iraq, confirmed Dr. Solecki's estimate of the age of his finds. She also regards the Baradost Culture as something previously completely unknown, but believes that it fills a gap between two other cultures previously known in Iraq, the Zarzi and the Hazer Merd cultures.

On Feb. 20 the **Clinical Society of the New York Polyclinic Medical School and Hospital** celebrated the 50th anniversary of its founding. Orrin Sage Wightman, one of the founders of the Society, was the guest of honor. He was formerly a professor of internal medicine and a member of the Board of Trustees of the institution. At present he is Chairman of the Board of Trustees of the New York Academy of Medicine.

The New York Polyclinic Medical School and Hospital is the pioneer postgraduate school in America and was founded in 1881. Physicians from every part of the world have visited it for postgraduate instruction in the various specialties of medicine and surgery. The hospital is a voluntary one with 400 beds and a very active out-patient department where over 100,000 patients are cared for annually without regard to race, color, or creed.

The U.S. Atomic Energy Commission has announced a regulation providing for issuance of uranium mining leases on certain public lands affected by the Mineral Leasing Act of 1920, particularly public lands covered by oil and gas leases. The regulation, **Domestic Uranium Program Circular 7,** is designed to encourage private companies and individuals to develop and produce uranium-bearing ores from public lands embraced within an offer, permit, application, or lease under the Mineral Leasing Act of 1920 or from lands which are known to be valuable for minerals leasable under that Act. Such lands are not open to mineral entry under the mining laws.

Copies of Circular 7 may be obtained from the Grand Junctions Operations Office of the Commission or from AEC offices located at Denver, Colo.; Hot Springs, S. Dak.; Douglas, Wyo.; Albuquerque, N. Mex.; Phoenix, Ariz.; Richfield and Salt Lake City, Utah.

Morphine can now be synthesized by a new method from coal tar products. The research was done at the Weizmann Institute of Science, Rehovet, Israel, by Dov Elad and David Ginsburg. It supplements a method announced in 1952 by Marshall Gates and Gilg Tschudi of the University of Rochester, N.Y.; their synthesis was the first solution to a long-standing chemical puzzle.

The new synthesis starts with phenanthrene, a three-ring carbon compound that occurs in coal tar. The earlier one began by using Schaeffer's acid, an aniline dye intermediate. Each builds up to a compound of Thebaine, or paramorphine. From there the conversion to morphine and its derivative, codeine, is the same in each process. The long and complicated procedures for artificial production of genuine morphine would make its manufacture too costly at the present time, but, once the key to a new chemical has been found, short cuts to cheapen its cost of production usually can be worked out within a relatively short time if need for the product is felt.

Scientists in the News

Homer L. Dodge, president emeritus of Norwich University and formerly professor of physics and dean of the graduate school at the University of Oklahoma, has completed the organization of the Cabot Program of Aviation at Norwich that has occupied his time since his retirement from the presidency in 1951. He is now living in Burlington, Vt., and devoting himself principally to travel lecturing in which he became interested with the advent of color photography. Last summer Dr. Dodge and his son Norton completed successfully the first trips ever made by canoe on the San Juan and Colorado Rivers from Mexican Hat, Utah, to Lees Ferry, Ariz., and on the Colorado from Hite, Utah, to Lees Ferry, a total distance of 355 miles in one of the most inaccessible parts of the United States.

In November the Louisville Surgical Society awarded the first David W. Yandell Medal to **Emile Holman,** professor of surgery at Stanford University. The annual award and lectureship were instituted to honor the memory of David W. Yandell, founder of the Society, who was professor of surgery in the University of Louisville School of Medicine from 1869 to 1898.

Jack Henry Jefferson has been appointed an associate professor in the Department of Chemistry of Southern University, Baton Rouge, La.

Walter Leighton, Jr., professor and chairman of the Department of Mathematics at Washington University, St. Louis, will assume a new position as head of the Department of Mathematics at the Carnegie Institute of Technology on July 1.

Victor L. Loosanoff, director of the U.S. Fish and Wildlife Service Marine Biological Laboratory, Milford, Conn., has been appointed honorary professor of zoology in the Graduate School of Rutgers University.

Three scientists are included among the ten outstanding young men of the year selected by the U.S. Junior Chamber of Commerce. They are: **Albert Schatz,** director of research and professor of microbiology, National Agricultural College, co-discoverer of Streptomycin; **Bernard J. Miller** of Laverock, Pa., surgeon research worker, and originator of a revolutionary heart-lung machine; **Maynard Malcolm Miller,**

geologist and explorer whose knowledge of glacier areas has been of great value to the armed services.

Roger W. Sperry has assumed his new duties as Hixon professor of psychobiology at the California Institute of Technology. Previously Dr. Sperry held a joint appointment as research associate in psychology at the University of Chicago and as chief of the Section on Developmental Neurology at the National Institute of Neurological Diseases and Blindness, National Institutes of Health, Bethesda, Md.

William H. Sutcliffe, Jr., staff biologist since 1951, has been appointed director of the Bermuda Biological Station. With this appointment, the Station enters on a new phase of its program in the promotion and support of marine research. In addition to its excellent location, the laboratory has much to offer to its staff and to visiting investigators. A motor launch and 61-ft research vessel are available, and laboratory accommodations with running seawater and ordinary supplies and equipment can be provided for about 25 persons. There is a library containing a working collection of books, serials, and reprints. Comfortable living quarters are available on the 14-acre station.

Membership in the Corporation of the Bermuda Biological Station is international and open to all who are interested. The officers and trustees who comprise its governing board are from Bermuda, Canada, Great Britain, and the United States. For details of the facilities and program, address the Director, Bermuda Biological Station, St. George's West, Bermuda.

The Office of International Relations, National Academy of Sciences—National Research Council, has provided the following information concerning the travel plans of scientific **visitors to the United States:**

A. G. Cook, Poultry Genetics Station, Cambridge, England; Agricultural Research Council. Arrived Dec. 3 for a 6-mo. stay at Purdue University (Prof. D. C. Warren) and University of California, Berkeley (Prof. I. M. Lerner).

J. W. B. King, Agricultural Research Council's Animal Breeding Research Organization, Edinburgh, Scotland. Arrived Dec. 22 for about 6 mos. to study population genetics with J. L. Lush, Iowa State College.

L. J. Mordell, Sadleirian professor of pure mathematics, University of Cambridge, England. Arrived in October and will be with the Mathematics Department, University of Toronto, until September.

Olavi Valdemar Perasalo, Assistant Chief Physician, University of Helsinki Hospital; surgeon, Helsinki Municipal TB Hospital, Finland. Arrived Dec. 9 for a 3-mo. stay to become acquainted with thorox surgery, especially heart and vein surgery. (Dr. Philip Owen, National Research Council, Washington, D. C.)

The Rt. Hon. Lord Rothschild, Director of Research, Dept. of Zoology, University of Cambridge, England. Here January through March.

Sir Robert Watson-Watt, F.R.S. Governing Director, Sir Rob't Watson-Watt & Partners, Ltd., London. Will be in Canada and the United States frequently in 1954. (Adalia Ltd., 306 Castle Building, 1410 Stanley Street, Montreal.)

D. Woodcock, Agricultural Research Council's Long Ashton Research Station, Bristol, England. Arrived Jan. 21 for about a 6-mo. stay to study organic chemistry as it relates to agriculture with Prof. W. M. Hoskins, University of California.

Education

The sixteenth session of the semi-annual **Philips X-ray Diffraction School** for registrants who find it convenient to visit New York City will be held at the plant of North American Philips Company, Inc., 750 South Fulton Ave., Mount Vernon, N.Y., during the week of April 19–23. Registration for the week-long school will be limited to 125 for the first four days and to 150 on Friday, this day being devoted to actual application problems when guest speakers discuss details on methods currently in use in research and industrial laboratories and plants. Since applications for attendance at the school held last October far outnumbered the available accomodations, it is recommended that those who wish to attend the coming session make reservations immediately. There is no registration fee. Philips held its first west coast X-ray Diffraction School last August for registrants in the San Francisco area; this western school will be repeated annually and registrations may be sent in now.

The **Rice Institute** has established a special curriculum designed to give engineering students in all major branches of engineering an essential knowledge of the nature of nuclear physics. The establishment of this curriculum is the Institute's answer to the increasing need for training in nuclear physics among students of mechanical, chemical, electrical, and civil engineering.

The new program will enable certain selected students in all four branches of engineering to take in their fourth or fifth years a course in nuclear physics given by members of the Physics Department and experts in this field, thus meeting the demand of individual companies and government for people with a knowledge of nuclear fundamentals. The new curriculum will be available in September, 1954.

A new Burch reflecting microscope, one of only two in the United States, has been installed in the microspectroscopic laboratory of the **University of Rochester.** The microscope is one of seven that are being built in England and is named after its designer, C. R. Burch, University of Bristol physicist. Its development and construction was supported by the Nuffield Foundation of England. The installation of both microscopes, one at Rochester and one at the Naval Research Laboratory, Washington, D.C., was directed by W. John Bates, an English physicist who helped supervise their construction.

A unique feature of the Burch instrument is its

main concave reflecting mirror, 3.5 in. in diameter, which is not spherical as in other reflecting microscopes. It is aspherical by 0.007 in. and this shape is produced with a precision of about 2×10^{-6} in. Unusually perfect images result. Mechanically, the microscope differs from others in that all moving parts slide on ball bearings mounted in V-grooves; this provides a high degree of motion accuracy. The University of Rochester microspectroscopic laboratory, located at the Medical Center, is under the direction of Theodore Dunham, Jr., a spectroscopy expert who for nearly 20 years was associated with the Mt. Wilson Observatory in California.

Grants and Fellowships

The following **AAAS research grants** have been awarded:

Oklahoma Academy of Science to Allen D. Linder, Dept. of Zoology, Oklahoma A. and M. College. The propagation and habits of darters of the genus *Etheostoma*.

Florida Academy of Science to Coleman J. Goin, Dept. of Biology, University of Florida. Preparation of a volume containing the original descriptions of all North American salamanders.

Florida Academy of Science to Howard K. Wallace, Dept. of Biology, University of Florida. Ecology, distribution, taxonomy, life history, etc., of spiders particularly of the families Lycosidae, Salticidae, Ctenizidae, and Atypidae, of Florida.

Indiana Academy of Science to S. S. Visher, Indiana University. A study of population changes in Indiana.

Indiana Academy of Science to L. S. McClung, Dept. of Bacteriology, Indiana University. The study of the characteristics of strains of the genus *Clostridium*.

Indiana Academy of Science to Fay Kenoyer Daily. To obtain data for use in the biological survey of Indiana.

Oregon Academy of Science to Williard B. Bleything, Pacific University. Various forms of disparate targets, in combination with filter systems for the producing of a phenomenon of three-dimension seeing.

Washington Academy of Science to Alfred Weissler, University of Maryland. Application of ultrasonic waves to chemical problems.

Washington Academy of Science to Herbert C. Hanson, Catholic University of America. Relationship of grassland communities to environmental conditions, particularly soils.

Georgia Academy of Science to John P. Knudsen, Oglethorpe University. Specific relationships and pupal coloration in the papilio machaon complex of Swallowtail butterflies.

Kentucky Academy of Science to Sister Virginia Heines, Nazareth College. Sugars in the *Phytolacca americana* berry.

Kentucky Academy of Science to O. J. Stewart, University of Kentucky. Investigation of the homing instinct of pigeons.

Texas Academy of Science to Richard J. Baldauf, Texas A. and M. College. Contributions to the cranial morphology of the Bufonidae.

Arkansas Academy of Science to Z. V. Harvalik, University of Arkansas. Reflectivity of metal films deposited at various low pressures.

Southern California Academy of Sciences to Louis C. Wheeler, University of Southern California. Rafinesquean specimens of Euphorbiaceae.

Michigan Academy of Science, Arts and Letters to Gertrude P. Kurath, University of Michigan. Michigan Indian music and dances in Cross Village and Mount Pleasant.

Michigan Academy of Science, Arts and Letters to Warren H. Wagner, University of Michigan. Chromosome numbers in ferns.

British Columbia Academy of Science to Robert W. Kennedy, University of British Columbia. Fungicidal toxicity of certain extraneous components from Douglas Fir Wood.

British Columbia Academy of Science to P. G. Morris, University of British Columbia. Petrology of the igneous rocks near Hell's Gate, B.C.

The **Atomic Energy Commission** has awarded the following unclassified physical research contracts:

University of Alabama. J. L. Kassner and E. L. Grove. Study of the principles, theory, and practice of high-frequency titrimetry, $6750.

University of Arizona. E. B. Kurtz, Jr. Study of uranium accumulation in plants, $2600.

California Institute of Technology. J. W. M. DuMond. Precision nuclear spectroscopy, $57,813.

University of California. J. A. Pask. Mechanics of metal-ceramic bonding, $12,500.

University of California. C. S. Garner. Isotopic exchange reactions, $14,410.

University of Southern California. H. H. Friedman. Solutions of inorganic electrolytes in solvents of low dielectric constant, $10,000.

Carnegie Institute of Technology. J. E. Goldman. Properties of rare metals, $12,312.

Carnegie Institute of Technology. G. Derge. Electrochemical studies of non-aqueous melts, $30,000.

Carnegie Institute of Technology. T. P. Kohman. Nuclear chemistry research, $42,552.

Columbia University. J. M. Miller. Research in the field of radiochemistry, $25,240.

Columbia University. C. H. Townes. Microwave spectroscopy, $20,500.

University of Connecticut. R. Ward. Tracer element distribution between a solid and a melt, $9000.

Illinois Institute of Technology. T. J. Neubert. Investigation of imperfections in solids, $5472.

Illinois Institute of Technology. G. Gibson. Fundamental chemistry of uranium, $7569.

Massachusetts Institute of Technology. C. D. Coryell and D. N. Hume. Nuclear chemistry research, $141,700.

University of Michigan. P. Elving. Polarographic behavior of organic compounds, $12,400.

University of Michigan. E. F. Westrum, Jr. Low temperature chemical thermodynamics, $8316.

Northwestern University. F. Basolo and R. G. Pearson. Mechanism of substitution reactions of inorganic complexes, $6696.

Oregon State College. T. H. Norris. Study of generalized acid-base phenomena with radioactive tracers, $7028.

University of Oregon. D. F. Swinehart. Study of gaseous chemical reaction kinetics, using a mass spectrometer, $9000.

Pennsylvania State College. W. C. Fernelius. Stabilities of coordination compounds and related problems, $15,000.

University of Pennsylvania. W. F. Love. Solid state physics at low temperatures, $12,000.

University of Pittsburgh. R. Levine. Synthesis of beta-diketones and beta-ketoesters with heterocyclic nuclei, $8500.

University of Pittsburgh. W. E. Wallace. Application of chemical thermodynamics to the study of metallic alloy formation, $13,702.

University of Pittsburgh. H. Freiser. Development and testing of organic reagents for use in inorganic analysis, $8500.

Purdue Research Foundation. H. C. Brown. Chemistry of polyvalent metal halides, $11,500.

Purdue Research Foundation. E. Bleuler. Research in nuclear reactions with fast alpha particles, neutrons, and deuterons and a study of nuclear structure, $50,000.

Purdue Research Foundation. E. M. Whaley. Basic research using high energy electrons and x-rays produced by a 300 mev synchrotron, $80,000.

Purdue Research Foundation. K. Lark-Horovitz. Linear electron accelerator for nuclear physics, $15,000.

Sylvania Electric Products, Inc. W. E. Kingston. Self-diffusion and high temperature phenomena, $40,000.

Syracuse University. L. Gordon. Coprecipitation studies, $12,500.

University of Tennessee. E. E. Stansbury. Studies on the direct measurement of the energy changes resulting from plastic deformation and phase transformations, $8300.

University of Tennessee. P. B. Stockdale. Investigation of the Chattanooga Black Shale as a source of uranium, $46,148.

University of Tennessee. H. A. Smith. Rates of catalytic reactions involving deuterium; and the relative vapor pressures of water and deuterium oxide in the presence of certain salts, $6402.

Vanderbilt University. M. D. Peterson. Radiation stability and inorganic radiochemistry, $22,100.

Virginia Engineering Experiment Station. N. F. Murphy. Mass transfer studies in liquid-liquid extraction, $2673.

University of Washington. J. H. Manley. Sixty-inch cyclotron program, $100,000.

Washington University. J. W. Kennedy. Generation of high voltages by means of nuclear radiations, $17,000.

University of Wichita Foundation for Industrial Research. L. L. Lyon. Permeability method of determining surface areas of finely divided materials, $15,300.

State University of Iowa. L. Eyring. Preparation of rare earth oxides, $9000.

Northwestern University. J. N. Pitts, Jr. Investigation of the photochemistry of organic acids, ethers, and ketones, $5500.

University of Wisconsin. J. R. Dillinger. Low temperature research, $8095.

Columbia University offers the following graduate opportunities in **botany** for 1954–55:

Industrial fellowships in plant biochemistry. For the study of polyphenolic pigments in plants, the inheritance and production of alkaloids in the Oriental Poppy, the biosynthesis of plant products using radiocarbon, and the chemistry of floral initiation. $1800–2400. Prof. R. F. Dawson.

Research assistantships in cytogenic and cell physiology. Two of these assistantships for the study of nucleic acid and nucleoprotein metabolism in cells using radioisotopes and autoradiographs are supported by an AEC grant. $1800. Prof. J. H. Taylor.

Research assistantships in cellular morphology. Several are available. Prof. E. B. Matzke.

Teaching assistantships in various areas. $1300 with free tuition.

For further information and application forms, address the professor concerned at Department of Botany, Columbia University, New York 27.

A fund of $238,500 for grants to universities and colleges to advance the teaching of science has been announced by the **Du Pont Company.** This new part of the company's program of aid to education is the result of an experimental plan announced last year. Reports coming in from many of the institutions receiving Du Pont grants indicate that they have a special need of assistance in the development of science teaching. In recognition of this need, the company has now made advancement of teaching the largest single part of its aid-to-education program, which for many years has also provided grants for fundamental research and postgraduate fellowships. Under the whole program it has authorized a total of more than $700,000 for the 1954–1955 academic year as compared with $600,000 for 1953. In the longer standing plans in the program, the company is granting $230,000 for fundamental research and $222,000 for postgraduate fellowships in science and engineering.

There are four separate plans in the new development: $100,000 to advance the teaching of chemistry in colleges; $73,000 for postgraduate teaching fellowships in chemistry; $25,500 for summer research grants for chemistry teachers in universities; and $49,000 for fellowships for master's degree training of high school science and mathematics teachers.

As is the case with its long-standing program of fellowships and grants-in-aid, Du Pont is making the new awards to selected institutions and is leaving decisions on detailed use of the funds up to them. Under the long-established program, the company is awarding 61 postgraduate fellowships in scientific fields, granting 26 in chemistry, 17 in chemical engineering, six in biochemistry, five in physics, four in mechanical engineering, and three in metallurgy. It also is continuing its grants-in-aid of $15,000 each to ten universities and $10,000 each to six universities. These grants are to build up knowledge through the support of unrestricted fundamental research in chemistry.

The **Jack Kriendler Memorial Foundation** recently gave $40,000 to the **New York Heart Association.**

The **National Multiple Sclerosis Society** has announced the following research grants:

National Agricultural College. A. Schatz, Dept. of Microbiology. Myelin research.

New York University College of Medicine. p. J. Harman, Dept. of Anatomy. Phenomenon of demyelination in the central nervous system of genetically-controlled rabbits and mice.

Mt. Sinai Hospital. H. Sobotka. Specific metabolism patterns in neurological disease, based on findings of the vitamin content in the cerebrospinal fluid of multiple sclerotics.

Washington University. E. Robins, Dept. of Psychiatry, and D. E. Smith, Dept. of Pathology. White matter in the central nervous system.

Militaerhospitalet, Copenhagen, Denmark. P. Thygesen. Effects of ACTH and cortisone in extremely high doses over long periods of time.

The following grants from the **National Vitamin Foundation, Inc.,** became effective Dec. 31, 1953:

Philadelphia Lying-In Hospital. W. T. Tompkins. Statistical analysis of results of 5-year clinical study on the significance of nutrition and nutritional deficiencies in pregnancy, $5000.

Johns Hopkins University. B. F. Chow. Metabolic role of vitamin B_{12}, $3000.

Western Reserve University. A. E. Axelrod. Role of nutrition factors in antibody production, $16,200.

University of California. M. M. Nelson. Multiple congenital abnormalities produced by maternal vitamin deficiencies, $3000.

Michael Reese Hospital. B. M. Kagan. Normal and pathologic physiology of vitamin A, $5000.

Western Reserve University. I. T. Kline. Pantothenic acid in the biosynthesis of steroids, $4000.

Vanderbilt University. W. J. Darby. Requirement and physiologic effects in the human of the newer hemopoietic vitamins, $5575.

To help meet the higher cost of graduate education, **Socony-Vacuum Oil Company, Inc.,** will increase the value of its research fellowships from $2000 to a maximum of $3000 each for the year 1954–55. Under the new plan, schools will normally receive $750, while married men will get $2250 and single men $1750. The company and its affiliates are maintaining fellowships for the 1953–54 academic year at the following institutions:

Socony-Vacuum Oil Company: Brooklyn Polytechnic Institute, Brown, Colorado, Colorado School of Mines, Columbia, Georgia Tech, Harvard, Illinois, Johns Hopkins, Lehigh, Michigan, Notre Dame, Ohio State, Pennsylvania, Wisconsin, Yale.

General Petroleum Corporation: California Institute of Technology, Southern California.

Magnolia Petroleum Company: Louisiana State, Rice Institute, Texas, Texas A & M, Tulane.

The institutions select recipients from students with at least one year of graduate work. Grants do not obligate the fellows as to future employment. Similarly, recipients are free to study subjects not connected with the petroleum industry. There are no restrictions on the publication of the results of investigations.

The **University of Pittsburgh** has received $15,000,000 grant for medical education from three local foundations, each of which contributed $5,000,000 They are the A. W. Mellon Educational and Charitable Trust, the Richard King Mellon Foundation, and the Sarah Mellon Scaife Foundation. The principal purpose of the grants is to enable the School of Medicine to strengthen and extend its program of developing a permanent faculty to augment the present staff, most of whom are part-time members.

Meetings and Elections

The American Society of Heating and Ventilating Engineers has elected the following officers for 1954: pres., Louis N. Hunter, National Radiator Co., Johnstown, Pa.; 1st v. pres., John E. Haines, Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.; 2nd v. pres., John W. James, McDonnell & Miller, Inc., Chicago, Ill.; treas., E. R. Queer, Pennsylvania State College, State College, Pa.

Anthropologists and folklore scholars joined together for meetings at the University of Arizona Dec. 28–30. Approximately 400 scholars from all parts of the United States attended, and world-wide progress in anthropological research was discussed by 133 speakers at 18 different sessions. An all-day symposium on the Southwest, under the chairmanship of Emil W. Haury, head of the University of Arizona Anthropology Department and director of the Arizona State Museum, covered the whole range of human progress in this area, from 10,000 years ago to the present. New reports on American folkways were presented by 18 folklore scholars who discussed the latest findings concerning old legends and folk songs that underlie this country's cultural heritage.

The meetings climaxed with a symposium on Indian affairs and the twenty-year record of the Indian Reorganization Act. Among those participating in this forum, which was arranged by William H. Kelly, director of the University's Bureau of Ethnic Research, were: Allan G. Harper, director of the Window Rock office, Bureau of Indian Affairs, chairman; John Collier, former commisioner of Indian Affairs, and professor of anthropology and sociology, City College of New York; Theodore Haas, former chief counsel, Bureau of Indian Affairs; Clarence Wesley, chairman, San Carlos Apache Tribal Council and president of the Arizona Inter-Tribal Council; and Clyde Kluckhohn, professor of anthropology, Harvard University.

Five national organizations participated in the program. The American Anthropological Association held its 52nd annual meeting jointly with the 65th annual meeting of the American Folklore Society. Co-sponsors were: The American Association of Physical Anthropologists, The American Ethnological Society, The Society for Applied Anthropology, and the Western States branch of the American Anthropological Association.

On Apr. 8–9 the **First Conference on Micro-circulatory Physiology and Pathology** will be held at the University of Texas, Galveston, under the sponsorship of the American Association of Anatomists. The conference will be devoted to a discussion of the techniques used to study living blood vessels and blood flow with the microscope. Detailed information may be obtained from E. H. Bloch, Western Reserve University, Cleveland 6, Ohio.

Seventy-two members of the **National Conservation Committee of the National Association of Biology Teachers,** representing 34 states, participated in a three-day work conference as a part of the annual meetings of the AAAS. Richard L. Weaver of the University of Michigan is chairman of the Committee and leader of its Conservation Project. The state and regional chairmen for the Project, assisted by 10 members of an advisory committee and the executive committee, edited a 360-page manuscript, "Handbook on Teaching Conservation and Resource-use Education," that will be published in 1954 by Interstate Press of Danville, Ill. The handbook will contain over 150 descriptions of conservation projects or programs from 30 states submitted by teachers through the members of the National Conservation Committee.

The Conservation Project has been underwritten for the first three years by a $10,000 grant-in-aid from the American Nature Association. The National Committee decided at its annual meeting to continue as a permanent project and committee of the National Association of Biology Teachers, in order to implement

some of the current projects and to expand the program in the areas of teacher training and state cooperation. Additional descriptions of outstanding school programs will be solicited and published in the journals of the many national organizations who have representatives on the advisory committee.

A new program to be cosponsored with the U.S. Soil Conservation Service under the direction of Bert D. Robinson will be the publication of an annual summary of all workshops in conservation education. Additional information on the Conservation Project and about the publications currently available should be addressed to Dr. Richard L. Weaver, P.O. Box 2073, Ann Arbor, Mich.

Under the sponsorship of the Wildlife Management Institute, the **19th North American Wildlife Conference** will take place in Chicago, Mar. 8–10. All phases of restoration and management of natural resources are scheduled for discussion. The programs for the sessions have been correlated and will be appraised at the close of the conference under the general theme "Natural resources—whose responsibility?" The Proceedings will be published by the Wildlife Management Institute, 709 Wire Bldg., Washington 5, D.C.

The **Pakistan Association for the Advancement of Science** held its sixth annual meeting in January with delegates from eight nations attending. Detlev W. Bronk, president of the National Academy of Sciences and past president of the AAAS, had been invited to represent the U.S., but could not be present. Self-help programs were stressed. The agenda included discussions on agriculture, chemistry, education, irrigation, public health, engineering, and forestry.

A unique event is scheduled for May 24–27 at the University of Michigan when, for the first time, the makers and users of instruments for industrial hygiene will be brought together at a technical and scientific symposium. This **Symposium on Instrumentation** is designed to make known to both groups what is available and what is needed in the field. The event, copresented by the University's Institute of Industrial Health and School of Public Health, will be of special interest not only to manufacturers and industrial hygienists, but also to physicists, chemists, safety engineers, meteorologists, noise investigators, engineers and others in related fields. The program will include exhibits, general sessions and technical papers on instrumentation in the following areas: sampling and analyzing for air contaminants in work places; laboratory-type instruments for industrial hygiene; atmospheric pollution evaluation; air velocity and metering of air; sound and vibration; ionizing radiations; and "home-assembled" instruments. Periods will be scheduled to permit the users of instruments to examine and exchange information with manufacturers' technical representatives. Facilities and program time will be allocated for manufacturers to schedule lectures, demonstrations, and group discussions of their own instruments. An important publication will grow out of the symposium—an illustrated book that will include technical data supplied by the instrument manufacturers.

The symposium has been officially endorsed by and is receiving enthusiastic support from the Scientific Apparatus Makers Association, American Industrial Hygiene Association, and American Conference of Governmental Industrial Hygienists. For further information write to Director, Continued Education, School of Public Health, University of Michigan, Ann Arbor.

The Johns Hopkins University School of Hygiene and Public Health and The National Vitamin Foundation are sponsoring a "**Symposium on problems of gerontology**" to be held on Mar. 2 at the Biltmore Hotel, New York City, in conjunction with the 9th annual meeting of The National Vitamin Foundation. The published proceedings will be available throughout the Foundation, 15 E. 58 St., New York 22.

Miscellaneous

In January the first issue of ***Industrial Science and Engineering*** was released. This is a science news magazine designed exclusively to assist students in adequate preparation for a career in some phase of industrial technology. The publication is planned to enable students to get a composite view of the many phases of industrial science, whether their interest lies in sales, research, administration, or production.

From the time of the inception of the Meteoritical Society in 1933, its "Notes and Contributions" were published regularly in the monthly magazine, *Popular Astronomy*, until December, 1951, when that periodical was discontinued on the completion of its 59th volume. By arrangement with the University of New Mexico and by unanimous vote of the Council of the Society, a new publication entitled ***Meteoritics: The Journal of the Meteoritical Society and the Institute of Meteoritics of the University of New Mexico*** was established, and its first issue, consisting ing of 25 items and 123 pages, appeared in December, 1953.

Meteoritics is to be issued at least once but not more than four times a year. It is expected that eventually the journal will become a quarterly. Each volume is intended to contain from 240 to 360 pages. The editor of the Meteoritical Society, Frederick C. Leonard of the University of California, Los Angeles, is the editor of *Meteoritics*, and the director of the Institute of Meteoritics of the University of New Mexico, Lincoln LaPaz, is the associate editor. The annual subscription price of *Meteoritics*, to both members and non-members of the Meteoritical Society, is $4.00 (or, to student members, $2.00), regardless of the number of issues published. Orders for subscriptions should be sent to the Secretary of the Meteoritical Society, Dr. John A. Russell, Department of Astronomy, University of Southern California, Los Angeles 7, Calif.

Association Business

Raymond L. Taylor

Associate Administrative Secretary, AAAS

THE beginning of the calendar year 1954 finds the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE with a full complement of administrative staff for the first time since March, 1953; indeed, the staff has been increased by one since the functions of the administrative secretary and of the editor and chairman of the Editorial Board are now the responsibilities of two persons.

Elsewhere in this issue will be found biographical sketches of George W. Beadle, professor of biology and chairman of the Division of Biology, California Institute of Technology, by acclamation, voted President Elect of the Association; of Dael Wolfle, director of the Commission on Human Resources and Advanced Training and, formerly, executive secretary of the American Psychological Association, appointed Administrative Secretary of the AAAS as of January 1, 1954; and of Paul A. Scherer, executive officer of the Carnegie Institution of Washington, appointed Treasurer of the Association to replace W. E. Wrather, who ably and with devotion, had served for nine years and had asked to be relieved. A sketch of Duane Roller, former assistant director, Hughes Research and Development Laboratories, formerly founder and editor of the *American Journal of Physics*, who has been filling the post of editor and chairman of the Editorial Board since December 1, 1953, has already appeared [*Science* **118**, 763 (Dec. 25, 1953)].

On the Board of Directors, Wallace R. Brode, associate director of the National Bureau of Standards, who had served for one year in completing the unexpired term of Warren Weaver, was re-elected for a full term of four years; also elected for four years, to replace Fernandus Payne, was Thomas Park, professor of zoology, University of Chicago.

A directory of all officers, appropriate at this time, follows:

General Officers

The general officers of the Association for 1954, that is, those elected by the Council, and their terms of office, indicated by expiration dates in parentheses, are:

President: Warren Weaver (1955), Rockefeller Foundation.

President Elect: George W. Beadle (1956), California Institute of Technology.

Retiring President: E. U. Condon (1954), Corning Glass Works.

Vice Presidents and Chairmen of the Sections (1954)

A Mathematics: Mina Rees, Hunter College
B Physics: Charles C. Lauritsen, California Institute of Technology
C Chemistry: W. M. Latimer, University of California, Berkeley
D Astronomy: Gerald M. Clemence, U.S. Naval Observatory
E Geology and Geography: Wallace W. Atwood, Jr., National Academy of Sciences
F Zoological Sciences: Horace W. Stunkard, New York University
G Botanical Sciences: Stanley A. Cain, University of Michigan
H Anthropology: Junius B. Bird, American Museum of Natural History
I Psychology: Donald B. Lindsley, University of California, Los Angeles
K Social and Economic Sciences: J. B. Condliffe, University of California, Berkeley
L History and Philosophy of Science: Chauncey D. Leake, University of Texas Medical Branch
M Engineering: Clarence E. Davies, American Society of Mechanical Engineers
N Medical Sciences: Charles B. Huggins, University of Chicago
O Agriculture: W. H. Pierre, Iowa State College
P Industrial Science: George L. Parkhurst, Standard Oil Company of California
Q Education: George Kyte, University of California, Berkeley

Members of the Board of Directors

George W. Beadle (1956), California Institute of Technology
Wallace R. Brode (1957), National Bureau of Standards
Edward U. Condon (1954), Corning Glass Works
John R. Dunning (1955), Columbia University
Walter S. Hunter (1954), Brown University
Mark H. Ingraham (1956), University of Wisconsin
Paul E. Klopsteg (1956), National Science Foundation
Thomas Park (1957), University of Chicago
Paul B. Sears (1954), Yale University
Laurence H. Snyder (1955), University of Oklahoma
Warren Weaver (1955), Rockefeller Foundation
Paul A. Scherer (ex officio), Carnegie Institution of Washington
Dael Wolfle (ex officio), AAAS

Administrative Officers

The administrative officers, that is, those appointed by the Board of Directors, follow:

In Washington at 1515 Massachusetts Avenue, NW:

Administrative Secretary: Dael Wolfle
Editor: Duane Roller
Associate Administrative Secretaries:
Raymond L. Taylor
John A. Behnke
Business Manager: Hans Nussbaum
Assistant Editor: Charlotte Meeting

Secretaries of the Sections and Subsections

A Mathematics: Rudolph E. Langer (1956), University of Wisconsin, Madison

B Physics: Fred L. Mohler (1955), National Bureau of Standards, Washington 25, D.C.

C Chemistry: Ed. F. Degering (1956), George Washington Inn, N.J. Ave. and C St., SE, Washington 3, D.C.

D Astronomy: Frank K. Edmondson (1957), Indiana University, Bloomington

E Geology and Geography: Jack B. Graham (1956), Legette and Brashears, 551 Fifth Ave., New York 17, N.Y.

F Zoological Sciences: Joseph H. Bodine (1955), State University of Iowa, Iowa City

G Botanical Sciences: Barry Commoner (1955), Washington University, St. Louis, Mo.

H Anthropology: Gabriel Lasker (1957), Wayne University College of Medicine, Detroit 26, Mich.

I Psychology: William D. Neff (1956), University of Chicago, Chicago 37, Ill.

K Social and Economic Sciences: Conrad Taeuber (1954), Bureau of Census, Washington 25, D.C.

L History and Philosophy of Science: Raymond J. Seeger (1956), National Science Foundation, Washington 25, D.C.

M Engineering: Frank D. Carvin (1956), Illinois Institute of Technology, Chicago, Ill.

N Medical Sciences and *Nm* Medicine: Allan D. Bass (1956), Vanderbilt University School of Medicine, Nashville, Tenn.

Nd Dentistry: Russell W. Bunting, University of Michigan School of Dentistry, Ann Arbor

Np Pharmacy: Glenn L. Jenkins, Purdue University School of Pharmacy, Lafayette, Ind.

O Agriculture: F. D. Keim (1957), University of Nebraska College of Agriculture, Lincoln

P Industrial Science: Allen T. Bonnell (1956), Drexel Institute of Technology, Philadelphia, Pa.

Q Education: Dean A. Worcester, University of Nebraska, Lincoln

Officers of the Pacific Division

President and Council Representative: A. H. Sturtevant, California Institute of Technology

President Elect: Edwin R. Guthrie, University of Washington

Retiring President: C. D. Shane, Lick Observatory

Secretary: Robert C. Miller, California Academy of Sciences, San Francisco, California

Officers of the Southwestern Division

President: Herbert L. Stahnke, Arizona State College

Vice President: Joe Dennis, Texas Technological College

Secretary and Council Representative: Frank E. E. Germann, University of Colorado, Boulder

Officers of the Alaska Division

President: Hugh A. Johnson, Alaska Agricultural Experiment Station, Palmer

Vice President: E. K. Day, Arctic Health Research Center, Anchorage

Secretary: Troy L. Péwé, U.S. Geological Survey, College, Alaska

Council Representative: John Calvin Reed, U.S. Geological Survey, Washington, D.C.

Council Meetings

At the meetings of the Council held in Boston on December 27 and 30, the principal business transacted, in addition to the election of officers, may be summarized as follows:

1. Approval of the recommendations of the Committee on Affiliation and Association during 1953, as follows:

Change from Associate to Affiliate Status:

American Dental Association
American Institute of Chemical Engineers
American Society of Agricultural Engineers

New Affiliates:

American Association of Immunologists
American Association of Physical Anthropologists
American Institute of Nutrition
American Society of Ichthyologists and Herpetologists
California Academy of Sciences
Society for American Archaeology
Society for Experimental Stress Analysis
Society of General Physiologists
Southern California Academy of Sciences
Utah Academy of Sciences, Arts and Letters

New Associates:

Astronomical League
International Association of Milk & Food Sanitarians, Inc.

Since there have been no withdrawals during the year and only one merger, the final figures at the end of 1953 are:

Affiliated societies	154
Associated societies	53
Affiliated academies of science	42
Total	249

2. Following the report of Dr. Payne, chairman of the Publications Committee, approval of motions (*a*) to thank Bentley Glass, William L. Straus, and Ruth C. Christman for their part-time services on the journals since April 1, 1953; and (*b*) to pay a special tribute to Howard A. Meyerhoff and Mrs. Gladys M. Keener for their devoted services prior to the termination of their work for the Association.

3. Approval, by a rising vote, of the following resolution prepared by a committee consisting of George R. Harrison, chairman, John R. Dunning, and Paul E. Klopsteg:

"Robert Andrews Millikan, president of the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE in 1929, died in Pasadena, California, on December 19, 1953, at the age of 85. For many years, the most distinguished of American physicists, Millikan's career led him to great heights of achievement in teaching and in university administration, as well as in research.

"His elementary textbooks for colleges and secondary schools, and his popular writings on science, were outstandingly successful. His leadership of the Cali-

fornia Institute of Technology from its re-organization in 1921, to his retirement in 1945, set a standard seldom equalled. His genius as an investigator led him to illuminate brilliantly each of the many fields of experimental physics to which he turned. His name will always be associated, first in the minds of physicists, with his classical measurements of the charge on the electron, but his work on vacuum spectroscopy and on cosmic rays runs this a close second in importance.

"Millikan was the scientist par excellence; and after his flowering at the University of Chicago, even his almost single-handed direction of the California Institute was not allowed to interfere with his duties as director of its Norman Bridge Laboratory of Physics, and with his work in the laboratory.

"Millikan was born in Morrison, Illinois, on March 22, 1868. He was graduated from Oberlin and obtained the doctorate from Columbia in 1895. Later, 20 other institutions shared the distinction of making him Doctor *Honoris Causa*. His more than a dozen medals and prizes were crowned by the Nobel Laureateship in 1923. He was a Lieutenant-Colonel in World War I, and directed the nation's scientific research efforts of that period.

"Millikan married Miss Greta Blanchard in 1902, who pre-deceased him by only a few months, and they raised three sons to become college professors.

"BE IT NOW, THEREFORE, RESOLVED: That this Council inscribe in its minutes, and convey to the surviving members of Dr. Millikan's family, its profound sense of loss in the passing of this distinguished scientist and leader of scientists; and record its satisfaction in the brilliant example furnished by his career, of a life spent most successfully in the service of science and of society."

4. Approval of the following resolution prepared by Paul Weiss by a rising vote:

"When Edwin Grant Conklin, president of the AAAS in 1936, passed away on November 11, 1952, just three days short of his 89th birthday, he left to us a legacy not only of recorded deeds in science, but of the undying spirit by which a life, well-lived in harmony and courage with wisdom and freedom, perpetuates and amplifies itself in future generations. Despite the credit he generously gave to his masters and teachers, we realize that he was in all essentials self-taught, in science as well as in religion and the classics, to which his early inclinations and indeed his early teaching were directed. Entering into biology during its dramatic rise from natural history to a science, he could combine the best of both epochs. His interest in the evolutionary past was equal to his analytical concern with casual mechanisms of development in the present; he early recognized heredity and adjustment to environment as partners, rather than antagonistic doctrines; his integrated view of organisms did not deter him from making the most painstaking classic studies on elemental cells; nor did his enormous store of detailed information about natural objects blur his vision of the great general principles that unify the multitude of phenomena. The wisdom of a balanced attitude thus marked his thoughts, works and words. Abhorring arrogant extremes and flashy dramatics, he made himself a champion of conciliation, looking with humor at human feats and failings. In fact, his preoccupation with biology seems to have been to him merely a step to understanding man himself. His primary and deepest interest was always in man; in real people; in mankind as a whole; and in the humanities, the culture that dignifies humanity. It is in this spirit that he has given so devotedly of his service and counsel not only to his many friends and students, but above all, to those scientific organizations that embodied his ideals: The National Academy of Sciences, the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, and, particularly, his beloved American Philosophical Society, of which he was president for two terms. To enumerate the many honors and signs of recognition accorded to this wise scientist and humanist, would merely be dead documentation of the live sense of reverence, appreciation and affection we all still feel in our vivid memory of him.

"BE IT THEREFORE RESOLVED: That the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE honor itself by inscribing this memorial in its minutes; and that the officers transmit to the members of his family word of this action with the condolences of the AAAS."

5. The report of the chairman of the Board of Directors, Detlev W. Bronk, included the following points:

(*a*) Minutes of the meetings of the Board during 1953, providing details of all actions taken, had been distributed to the Council; (*b*) the desirability of a new headquarters building for the Association as soon as possible; (*c*) publication of two symposium volumes, reprint of another, and preparation of four now in press; (*d*) inauguration of a Microcard edition of *Science*; (*e*) two members added to the Editorial Board; (*f*) study on the problem of a biographical directory of American scientists; (*g*) the establishment of a third center for the Gordon Research Conferences; (*h*) the satisfactory financial condition of the Association and final payments to the Cattell estate; and (*i*) mutually satisfactory settlements made with Dr. Meyerhoff and Mrs. Keener, whose faithful services the Board of Directors warmly appreciated.

The desirability of a standing Committee of the Council on Resolutions, which could be of assistance to the Association in taking positions on important questions, was suggested; the new appointments were commented on and, in particular, it was stated that the new administrative secretary had met with the Board and that there was complete agreement with regard to the nature of his duties, his responsibilities, and his opportunities. The appropriation for the Arden House study had been placed under his direction.

In conclusion, it was announced that a committee to examine the operation of the Association under its Constitution and Bylaws had been appointed by the board as follows: Wallace R. Brode, chairman; Roger Adams; Meredith F. Burrill; Clarence E. Davies; and Milton O. Lee; with Howard A. Meyerhoff and Dael Wolfle as consultants. It was moved by Dr. Meyerhoff, seconded, and passed unanimously that Dr. Bronk's report be accepted.

6. Dr. R. E. Blackwelder commented at length and favorably on Dr. Bronk's report, especially on the mutually satisfactory understanding between the Board of Directors and the new administrative secretary; he called, successfully, for Council approval of the committee on the study of the operation of the Association under the

Constitution and Bylaws, as already named by the Board.

7. The proposed Committee on Resolutions was approved.

8. The following resolution prepared by Paul E. Klopsteg was adopted:

> RESOLVED, that the Council of the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, assembled at Boston on the occasion of its 120th meeting, expresses its approval and commendation of the proposal by President Eisenhower before the United Nations for international cooperation toward the beneficial utilization of nuclear energy. Many scientific and technical problems remain to be solved in such an undertaking. Scientists throughout the world will welcome the opportunity to work together on these problems as a service in the interests of peace and a contribution to the welfare of all peoples. Science is a major constructive force in the world. It knows no geographical boundaries. Hence the prospect of bringing scientists from many countries together in a collaborative research and development effort in this promising area provides great hope not only for immeasurable material benefits but especially for better understanding and goodwill among nations.

9. Approval of a motion that the Council go on record, in behalf of the Association, and convey the great appreciation of the splendid work of the Local Committees headed by Earl P. Stevenson, president of Arthur D. Little, Inc.

10. Dr. Glass expressed his hope that Council members would assume closer and more direct relationships with the editor and Editorial Board by securing suitable manuscripts and functioning as advisors and referees.

11. President Condon called attention to the suggestion of the administrative staff that, as far as possible, the affiliated societies and academies of science arrange the terms of their representatives on the AAAS Council to begin and end on a calendar year basis, since this has obvious advantages in facilitating the work of the Section Committees, in printing the Program-Directory and, in general, could mean that representatives might have a year's background in Association affairs prior to the annual meetings.

12. Approval of a motion to thank the British Association and Dr. A. V. Hill for his active participation in the Boston meeting.

13. Dr. W. Montague Cobb inquired if the Board of Directors sometime in the past had passed a ruling to the effect that the Association should meet only in localities where equal hotel accommodations would be open to all members without discrimination. Though it was impossible to give a definite answer to this question at the time, it was made clear that, in deciding on meetings, the Board and the administrative staff give serious consideration to all aspects of this matter. There was considerable discussion on the best approaches to the eventual solution of the problem of segregation at scientific meetings, where it may exist, but no action was taken by the Council.

A Report of the Boston Meeting, December 26–31, 1953

Raymond L. Taylor

Associate Administrative Secretary, AAAS

THE REPORT of a large scientific meeting serves several useful purposes. For future reference, it provides a record of those data and highlights by which a meeting can be appraised or compared, and it may call attention to events of more than transient importance. Those who have just attended are reminded of their personal impressions; those who were not there may be informed of what was missed—and may be prompted to plan to attend another time.

The 120th meeting of the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, now with the status of "the past AAAS meeting," takes its place in the annals as one of the best in all respects. Favored by mild, pleasant weather throughout, characterized by really good programs in all principal sciences, and noteworthy for the uniformly high level of friendly cooperation on the part of the local members and friends of the Association, this Seventh Boston Meeting continued in the rich vein of hospitality and interest manifested in the six prior meetings in Boston, as described in a previous article [*Science* 118, 224, (1953)]. The local committee entertained the board of directors, officers, and administrative staff of the Association at a buffet supper; dinners and social events arranged by the sections and societies were numerous, and many resident scientists invited out-of-town speakers and colleagues to their homes. Both in paid registrations, 3315,[1] and in other measured attendance, this was the largest AAAS Boston meeting by a substantial margin.

The meeting had sessions of all types, and in good balance. No principal field of science was neglected. There were programs for specialists, arranged by large societies holding their national meetings with the Association and also by some of the AAAS sections. And there were also symposia that were in areas between, or embracing, several scientific disciplines, characteristic of meetings of the Association. There were all the features expected at AAAS meetings—outstanding general addresses by eminent leaders in science, the latest scientific films, a large-scale series of exhibits, a "Biologists' Smoker" with refreshments, open to all registrants. There were conferences on problems of the academies, on editorial matters, on scientific manpower. And there was a penetrating, able consideration of the position of scientists in American society today. All these aspects of the 120th meeting deserve more than passing attention.

General Symposia. Early in March, 1953, the AAAS Symposium Committee, appointed by President Condon for that year, met to decide the theme of the 120th meet-

[1] Registration data for the previous Boston meetings: 1946—2736; 1933—2351; 1922—2339; 1909—1140; 1898—903; and 1880—979.

ing, "Scientific Resources for Freedom," and to settle upon one or more general symposia, to be sponsored by the Association as a whole. Three programs and the persons to implement them were decided upon, nearly ten months before this Boston meeting. The sound judgement of the Committee was demonstrated and fulfilled when, on December 27 and 29, all three programs were received by appreciative audiences which, in general, filled, and upon occasion, overflowed, the large Paul Revere Auditorium of the Mechanics Building. The first of these general symposia presented was *Species Which Feed Mankind*. It was planned to focus attention on the relatively small number of plant and animal species that form the staple foods of the world's populations, and on some of the diverse technical problems of maintaining these species in adequate supply. Beginning on Sunday morning and before all the geneticists had arrived, it was, under the circumstances, well attended. Part I, devoted to some of the problems associated with the critical food plant, maize, was arranged by Paul C. Mangelsdorf; Part II, dealing with other problems of several animal food sources, was organized by M. R. Irwin.

The two sessions of *The Sea Frontier*, arranged by Alfred C. Redfield and Jerome C. Hunsaker, brought together in one program a most interesting diversity of papers on the geological, oceanographic, engineering, and food resources aspects of the margin or interface where land and sea meet. The speakers, all eminent authorities in their fields, complemented each others' reports so that this proved to be one of the most successful interdisciplinary general symposia in recent years.

The two parts of *The Scientist in American Society*, were independently conceived and arranged, respectively, by Section K and a subcommittee of the Symposium Committee, consisting of Charles D. Coryell, chairman, Bart J. Bok, Philip M. Morse, and Victor F. Weisskopf. Dr. Weisskopf spoke in place of Dr. Urey who, at the last minute, found that, to accept an award, he had to delay his arrival in Boston one day. The thoughtful, well-delivered papers of this program, devoted to the general area of freedom for scientific inquiry in today's troubled world, pleased the large and responsive audience. Requests to publish some or all these papers already have come from several quarters. The papers for Part II will appear in the March issue of *The Scientific Monthly*.

Other Symposia. Though several of the sections decided to have fewer and more definitive symposia at Boston, the total number of symposia and groups of invited papers on assigned subjects arranged by the sections and subsections was 41 (comprising 65 sessions, an average of 1.6 sessions each). With the 19 additional one-session symposia arranged by 12 of the participating organizations and the Association's general symposia, necessarily largely concentrated on four days, there was, as usual, an embarrassment of riches. Yet, as the appended reports of the secretaries or program chairmen of the sections and societies indicate, virtually each program attracted a satisfactory and appreciative attendance.

The general problem of how many symposia may be ideal for an AAAS meeting is uncertain. A technical symposium on a subject such as *Radio Astronomy* will not compete with another specialized program, such as *Antimetabolites and Cancer*, even if scheduled concurrently. On the other hand, all sessions of any sort are in potential and mutual conflict with any broad program planned to appeal to a large proportion of the entire attendance. The pattern of scheduling specialized symposia and sessions for contributed papers in the mornings, the broader and interdisciplinary symposia in the afternoons, and the most general events in the evening, although followed in the main, cannot be completely realized because of the logical wish of each group to hold a two- or three-session symposium on a single day, and the tendency of the participating societies to arrange their sessions so that their memberships will have a minimum number of nights for which to pay for sleeping accommodations. Experience has shown, however, that if the total attendance at the meeting is sufficient, both the specialized and the general programs will have audiences considered satisfactory by those who arranged them; in any event, each program chairman or presiding officer has the satisfaction of knowing that every nonspeaker present in the room, confronted by many alternatives, has *chosen* to attend his session. At Boston, it is believed that most symposia had an adequate attendance and, indeed, capacity audiences were common.

Conferences. Among the growing number of conferences at AAAS meetings, the Academy Conference again broke an attendance record, the Conference on Scientific Manpower III held three important sessions, and the Conference on Scientific Editorial Problems II evoked so much interest that it plans multiple sessions for 1954. An important conference on "The validation of scientific theories," sponsored by the National Science Foundation and held at the American Academy of Sciences, one session of which was listed in Section L's program, has been reported elsewhere in *Science*.

Special Sessions. The special sessions which add so much to the meetings each year—the distinguished evening addresses sponsored by the National Geographic Society, the Scientific Research Society of America, the Society of the Sigma Xi, the United Chapters of Phi Beta Kappa, and the AAAS presidential address itself—without exception attracted large and appreciative audiences. Too late for change in the General Program-Directory, the National Geographic Society's Illustrated Lecture, instead of the speaker listed, was given by Volkmar Wentzel, a staff member; his subject was "Into the heart of free Africa." Jointly with the AAAS, the Society of the Sigma Xi sponsored the scholarly, amusingly anecdotal address, "The design and mechanism of muscle," by A. V. Hill, recent past president of the British Association. The thoughtful and timely address of AAAS retiring president, Detlev W. Bronk, "The role of scientists in the furtherance of science," appears in this issue; he was preceded by the general chairman, Earl P. Stevenson, who welcomed the AAAS to Boston with well-chosen and gracious remarks. At the fifth of the annual addresses of the Scientific Research Society of America, a great authority on suspension bridges, David B. Steinman, spoke on "Suspension bridges—the aerodynamic problem and its solution;" and it was announced that he was the recipient of the Society's William Procter Prize for 1953. The Phi Beta Kappa address of Leonard Carmichael, "Science and social conservatism," December 30, concluded this splendid series of special sessions of the 1953 AAAS Meeting.

Business Sessions. In accordance with the Constitution, the Board of Directors of the Association held one of its four regular meetings of the year at Boston, its sessions preceding the two sessions of the Council. As stated elsewhere, a gratifying number of Council members were present to elect the new officers of the Association, to hear and to accept Detlev Bronk's report of an eventful year, and to take action on committees, one of which will immediately undertake a study of the operation of the

Association under the present Constitution and Bylaws and report at the next meeting of the Council, December 1954, in Berkeley, California. With the filling of the vacancies in the enlarged administrative staff, the Association, now well into its 106th year, stands on the threshold of new opportunities to be of service to science and to society.

Analysis of sessions. In addition to the 18 sections and subsections of the Association, all of which had one or more sessions (for a total of 104), 63 societies and other organizations officially participated in the Boston meeting. Of this number, 16 societies had national meetings, their sessions totaling 102; 24 had regional meetings, with 45 sessions; and the remaining 23 organizations were official cosponsors of programs arranged by AAAS sections or other societies. An analysis of the grand total of 265 sessions follows (Tables 1 and 2).

TABLE 1. Analysis of sessions of the Boston meeting.

Number of sessions for contributed papers	71
Number of sessions of symposia	88
Number of sessions of conferences	10
Number of roundtable sessions	15
Number of business sessions	36
Number of meal functions (often with addresses)	30
Number of other sessions with addresses	15
Total number of sessions	265

Association or of a participating society. Individually, they may wish to secure the detailed General Program-Directory, to attend the Science Theatre or the Biologists' Smoker (the two events which, strictly, are available only to registrants), but primarily, it is believed, they wish to be a real part of the meeting and to contribute to its support. As members of the participating societies, they realize that the AAAS has made all physical arrangements, has provided free session rooms, has absorbed the substantial costs of projection, and has printed all program details; and they take satisfaction in paying the moderate $2.50 registration fee.

Registration totals for all earlier Boston meetings have already been mentioned. The seventh Boston meeting exceeded the sixth Boston meeting of 1946 by 579, or 21 percent. Though 53 percent of the attendance came from the six New England states, it was a truly national meeting, like its predecessors. There were registrants from all but three states of the nation (Idaho, Nevada, Wyoming), as the table on geographical distribution shows. More than at any meeting in recent years, there was a substantial number of distinguished foreign scientists in attendance. In addition to 29 speakers and presiding officers from all parts of Canada, there were 21 scientists from 8 foreign countries who actively participated in the program. Dr. H. P. A. de Boom officially represented the South African AAS and, as noted, Dr. A. V. Hill, recent

TABLE 2. Comparison of sectional and societal programs.

	By AAAS sections	By the societies	Total sessions	Total no. of authors
No. of sessions for contributed papers	21 (by 8 sections) 133 authors	50 (by 15 societies) 411 authors	71	544
No. of sessions for symposia or groups of invited papers	69 (by 16 sections and AAAS as a whole) 308 authors	19 (by 12 societies) 69 authors	88	377
Papers by discussants and program chairmen	39	49		88
No. of addresses	14	12		26
		Total		1095

The total of 1095 authors does not include junior authors of many of the contributed papers, 123 papers read by title, or presiding officers, unless remarks by them were listed in the programs.

Attendance. At any annual meeting of the Association, the total number of persons who attend some session or phase of the convention, or who see the large-scale Annual Exposition of Science and Industry, typically exceeds 10,000, and this was true at the seventh Boston meeting. The total attendance, since it is *not* synonymous with paid registrations, can only be estimated from such data as the following:

Registrants who paid	3315
Science writers and other reporters	192
Exhibitor personnel	472
Adults who saw Exposition by complimentary admission tickets	7250
Total	11,229

Undoubtedly, still other persons attended one of the evening lectures or were present at one of the sessions in Harvard or M.I.T. where no registration facilities were provided.

A majority of those who register are members of the

past president of the British Association, gave an address cosponsored by the AAAS and the Society of the Sigma Xi.

Members of the sections and of the participating societies, and exhibitors who are interested in making contact with them, alike, are interested in how many scientists in a given field may have attended. It is for this reason that the registration slips include Item 5, "Field of Interest." A statistical breakdown of the 3315 registration slips, grouping narrow specialties, is supplied in Table 4. Of the 7250 adults who deposited cards of complimentary admission to the Exposition, about half, or 3501, supplied their fields of interest. These data will be found in another column in Table 4.

The Biologists' Smoker. The Biologists' Smoker—which all registrants, biologists or otherwise, are cordially invited to attend—was sponsored jointly by the American Society of Naturalists, traditionally its original sponsor, and the AAAS, on Tuesday evening, December 29, from 8:30 until 11:30 P.M., in the Grand Hall of Mechanics Building. The starting hour, which overlapped the closing time of the Exposition by thirty minutes, was fixed to permit attendance following the dinners of the chem-

TABLE 3. Distribution of registrants by states and countries.

Alabama	6	Oklahoma	6
Arizona	1	Oregon	1
Arkansas	2	Pennsylvania	148
California	46	Rhode Island	86
Colorado	4	South Carolina	7
Connecticut	177	South Dakota	2
Delaware	10	Tennessee	32
District of Columbia	99	Texas	24
Florida	22	Utah	5
Georgia	11	Vermont	22
Illinois	76	Virginia	44
Indiana	41	Washington	4
Iowa	21	West Virginia	8
Kansas	6	Wisconsin	13
Kentucky	7	Total, U.S.	3252
Louisiana	14		
Maine	58	Alaska	2
Maryland	99	Argentina	1
Massachusetts	1354	Australia	1
Michigan	55	Brazil	1
Minnesota	17	British West Indies	1
Mississippi	2	Canada	43
Missouri	20	Ceylon	1
Montana	4	Colombia	1
Nebraska	12	Cuba	2
New Hampshire	49	England	4
New Jersey	130	Hawaii	2
New Mexico	3	Mexico	1
New York	424	Pakistan	1
North Carolina	21	Scotland	2
North Dakota	1		
Ohio	58	Total Registration	3315

ists, geneticists, and zoologists, and the two special evening events, the RESA Address and *The Scientist in American Society*, Part II. About 2500 enjoyed the opportunity to renew contacts with their colleagues. Cigarettes were provided through the courtesy of Philip Morris & Co. Ltd., Inc.; the beer was donated by Haffenroffer & Co., Inc. of Boston; the Coca-Cola and several products of the National Biscuit Company, in each instance, were generously supplied by their manufacturers with the cooperation of local distributors. The Association acknowledges with much appreciation these generous contributions.

Physical Arrangements. Mechanics Building, the site of the exhibits of all large conventions in Boston, was the logical focus of the Association's 120th meeting. Here were located the AAAS office, Main Registration-Information Center, Visible Directory of Registrants, AAAS Science Theatre, and the Annual Exposition of Science and Industry, in close proximity to the large Grand Hall, used for the Lecture of the National Geographic Society and the Biologists' Smoker, and four regular session rooms. Four more session rooms were improvised so that not only all the general symposia but most of the sectional symposia could be held in close relationship to the Exposition and the Science Theatre.

The geneticists and botanists were based in the Copley Square hotels two short blocks east of Mechanics Building; four blocks further east the zoologists and medical groups were in the Statler, which was also AAAS headquarters hotel. The science teachers filled the Hotel Bradford on Tremont Street, and the economic and industrial science groups held their sessions at the Somerset.

Projection and Other Equipment Requirements. Projection and other equipment requirements were heavy but were most efficiently handled by the service committee which had complete responsibility for the complex logistical problem of assembling lanterns, screens, 16 mm projectors, tape recorders, and special equipment (in one instance, of making special slides for a speaker); of labeling, assigning, and distributing all equipment; of making all arrangements with projectionists, professionals and others; of supervising all operations from early till late; and of collecting and returning all equipment. The Association is greatly indebted to all who contributed their time and effort, and especially to this committee's indefatigable chairman, Carl Peterson.

Work of the Local Committees. As must be apparent to all members of the Association, it would be quite impossible successfully to arrange a large and complex AAAS meeting, to carry it through to a satisfactory conclusion, and, indeed, to finance it, were it not for the genuine interest and effective personal services of local members and friends of the Association. Thus, in a very real sense, the success of the seventh Boston meeting is attributable to the sound advice and substantial personal attention of the general chairman, Earl P. Stevenson, president, Arthur D. Little, Inc., and of those whom he asked to serve. It is noteworthy that Dr. Stevenson accepted this responsibility in the fall of 1952, attended and studied the operation of

TABLE 4. Subject fields of attendance.

	3315: Registrants	3501: Complimentary admissions	Total
Mathematics	28	23	51
Physical Sciences			
Physics	191	863	1054
Meteorology	24	21	45
Chemistry	228	264	492
Astronomy	33	21	54
Geology and Geography	110	73	183
Geophysics	37	10	47
Engineering	83	533	616
Biological Sciences			
Botany and Plant Physiology	163	20	183
Genetics	236	5	241
Zoological Sciences	465	22	487
Other Biology	299	54	353
Agriculture	41	35	76
Medical Sciences			
Biochemistry and Nutrition	130	28	158
Physiology	121	16	137
Dental Research	29	9	38
Pharmacy	75	10	85
Other Medicine	262	217	479
Psychology	164	53	217
Anthropology and Archaeology	63	18	81
Economic and Social Sciences	49	34	83
History and Philosophy of Science	28	9	37
Science Teaching and Education	177	103	280
General	279	1060	1339
Total	3315	3501	6816

the St. Louis Meeting, appointed his committees early in 1953, and maintained close touch with all developments until the books of the meeting were closed last month. On behalf of the officers and members of the Association, and for himself, the writer expresses deep appreciation and thanks to Dr. Stevenson; and also to vice chairman Walter S. Baird, president, Baird Associates, Inc., who headed the Exhibits Committee; Carlton P. Fuller, vice president, Polaroid Corporation, chairman of the finance committee; Wallace Dickson, director of public relations, The New England Council, chairman of the public relations committee; Carl M. F. Peterson, superintendent of buildings and power, M.I.T., who accepted the resonsibility of directing the service committee; and to each member of all local committees. An expression of grateful appreciation is particularly due Warren S. Berg, Arthur D. Little, Inc., who served as executive secretary of the local committees with unfailing enthusiasm and efficiency throughout the year; and Donald D. Hathaway, Baird Associates, Inc., who served so effectively as secretary of the exhibits committee.

Housing and Registration. Housing and registration were efficiently handled by the experienced staff of the Convention Bureau of the Boston Chamber of Commerce, headed by James A. Morrison. His help throughout the year is gratefully acknowledged.

AAAS Public Information Service. Those who attended the Boston Meeting and visited the AAAS press room on the Mezzanine of the Hotel Statler gained some impression of the efficient way the science writers and other reporters were provided with releases during the meeting by Sidney S. Negus and his staff. Typically, the press room opens five or six days before the meeting begins and remains open for long hours thereafter until the meeting is over. In the months preceding the meeting, Dr. Negus, the Association's director of public information, who is chairman of the Department of Biochemistry, Medical College of Virginia, is increasingly busy preparing for it; and for months after a meeting—while the supply may last—he provides copies of papers to those who request them. The Association is indebted to Arthur D. Little, Inc., Monsanto Chemical Company, American Tobacco Company, and U.S. Steel, which provided luncheons for representatives of the press, radio, and television during the meeting.

Pre-meeting publicity in the local press and magazines, for example in *The New Englander*, the dissemination of releases in Greater Boston, and the coverage of the meeting by local newspapers while it is in progress, were the responsibility of the local committee, the chairman of which was Wallace Dickson of The New England Council. This assignment was very well done and thanks are due all members of the committee. Miss June Lord of the United Community Service was most helpful in handling the radio and television arrangements. The 192 science writers and reporters who requested releases exceeded the 178 at St. Louis and 162 in Philadelphia in 1952 and 1951, respectively.

AAAS Science Theatre. Beginning Sunday afternoon, in seven programs, each four hours long, 40 of the latest foreign and domestic films were presented to appreciative audiences that consistently filled the improvised room of 300 capacity in Mechanics Building. Most titles, nearly all in color and with sound, were shown twice. The Association again expresses its appreciation to those who so kindly lent such excellent films.

Annual Exposition of Science and Industry. In addition to some 3300 registrants, 7250 science-minded adults deposited complimentary cards of admission and saw one of the best expositions ever sponsored by the Association. The 1953 Annual Exposition of Science and Industry—with 95 exhibitors and 153 booths exhibiting the latest in scientific books, instruments, and materials used by scientists—occupied some 30,000 square feet in the Main Exhibition Hall of the venerable Mechanics Building. In addition, there were individual industrial exhibits ranging from transistors to a great jet engine, and others from water fleas to live chimpanzees. On an experimental basis, nearly half of the exhibit area was developed as a "New England Section" with special decorations in prismatic colors (which were financed by premium rentals and special contributions). The New England exhibits which featured the latest technological developments in this local area both enriched the Show and assisted materially in financing the meeting.

Industrial firms with booth space in the Annual Exposition of Science and Industry not mentioned in either the 1953 General Program-Directory or in the Preconvention Issue of *Science* were:

Air Reduction Sales Corporation
Alden Products
Cambridge Corporation
Hood Rubber Company
F. C. Meichsner Company
Transistor Products, Inc.

As planned originally, the New England Section, in particular, included a most interesting series of exhibits of nonprofit organizations. The booths these occupied were sponsored principally by local companies who did not find it convenient to exhibit but who wished to support the meeting, but there were three exhibitors among those who endowed booth space or made outright contributions. Organizations with sponsored booth space in the Annual Exposition of Science and Industry not mentioned in either the 1953 General Program-Directory or in the Preconvention Issue of *Science* were:

Air Force Cambridge Research Center
Amateur Telescope Makers of Boston
American Academy of Arts and Sciences
Arnold Arboretum
Boston Public Library
Boston Symphony Orchestra
Boston University
Christian Science Monitor
Federation of American Scientists
Harvard University Medical School
Harvard University School of Public Health (specifically endowed by the Kendall Company)
Massachusetts Institute of Technology
New England Council
Tufts College
U. S. Army, Watertown Arsenal
Weston College
Woods Hole Oceanographic Institution

Companies contributing to the Boston Meeting of the Association were:

Godfrey L. Cabot, Inc. (exhibitor also)
Comstock & Westcott, Inc.
Dennison Manufacturing Company
Dewey and Almy Chemical Company
Draper Corporation
The Foxboro Company
Gamewell Company
John Hancock Mutual Life Insurance Company
Carl Heinrich Company
Howe & French, Inc.
Jarrel-Ash Company

Jenney Manufacturing Co.
Kendall Company, Bauer & Black Division
Arthur D. Little, Inc. (exhibitor also)
Chas. T. Main, Inc.
Monsanto Chemical Company (exhibitor also)
New England Gas and Electric System
Norton Company
Pitney-Bowes, Inc.
Saco-Lowell Shops
Sprague Electric Company
United Aircraft Corporation
United-Carr Fastener Corporation
United Shoe Machinery Corp.
Whitin Machine Works

Their generous contributions are gratefully acknowledged.

Reports of Sections and Societies, Boston Meeting

Section on Mathematics (A)

Section A met Dec. 28. On this occasion W. T. Martin delivered his retiring address as vice president. The title of the address was "Some probability distributions arising in the mathematical theory of Brownian motion." The session was presided over by the secretary. The attendance was 40.

RUDOLPH E. LANGER, *Secretary*

Section on Physics (B)

A symposium on *Physics of the upper atmosphere* was arranged by Walter Baginsky of the Air Force Cambridge Research Center (AFCRC) and was presented in two sessions, Dec. 28.

Ludwig Katz, AFCRC, discussed the theoretical relations expected to exist between magnetic fluctuations and currents in the ionosphere. D. G. Knapp, Coast and Geodetic Survey, discussed the magnetic measurements, and T. N. Gautier of the National Bureau of Standards described experimental measurements of ionospheric winds based on ionospheric reflection of radio waves.

F. S. Johnson, J. D. Purcell, and R. Tousey of the Naval Research Laboratory presented the final results of the NRL programs of spectroscopic observations from rockets. These results were analyzed to derive the spectral distribution of solar radiation outside the earth's atmosphere in the ultraviolet. Soft x-rays make an important contribution to the ionizing radiation.

A. C. Faire, A. L. Aden (AFCRC), and O. T. Fundingsland, Electronic Defense Laboratories, described laboratory experiments on the recombination coefficients of atmospheric gases using microwave technics.

An important contribution to the symposium was the address of the retiring chairman of Section B, E. O. Hulburt of the Naval Research Laboratory, "Magnetic storms, aurorae, ionosphere, and zodiacal light." He gave a comprehensive survey of the current status of the observations and theories of these phenomena.

M. O'Day (AFCRC) described the broad program of research of his laboratory, in which rockets have been used to obtain upper-air measurements. S. N. Ghosh of Wentworth Institute discussed the theoretical interrelations of these measurements. R. A. Minzner (AFCRC) summarized the current status of upper-air temperature as a function of altitude. J. Pressman (AFCRC) covered variations of atmospheric temperature in the ozone layer.

The program, as a whole, gave an excellent summary of the important new developments in research on upper air phenomena.

A symposium on *Physics in biology*, arranged by Richard S. Bear of MIT, was held in two sessions Dec. 29. A very wide range of applications of physics to biological phenomena was covered. Only a few of the interesting contributions will be listed.

A paper by Alexander Hollaender of the Oak Ridge National Laboratory on the reversal of biological effects of radiation under continued irradiation showed that this surprising effect occurs in many organisms. A paper by Barbara W. Low of Harvard Medical School on three-dimensional features of protein structures was beautifully illustrated with large scale models, which made her presentation of this subject very effective. Gordon L. Brownell of Massachusetts General Hospital and MIT described important developments on the localization of tumors by radioisotopic tracers. The circumstance that certain radioisotopes concentrate in tumors makes it possible by modern crystal counter technics to localize deep lying tumors. The technic has been useful in locating brain tumors.

Section B was cosponsor of two symposia arranged by Section D on *Radio astronomy* and on the *Origin of meteorites*. The American Meteorological Society arranged symposia on *Cloud physics* and *Synoptic meteorology*.

A physicists' dinner, Dec. 28, was arranged by Sigma Pi Sigma and cosponsored by Section B. Dr. Waterman gave a talk on the program of the National Science Foundation.

FRED L. MOHLER, *Secretary*

Section on Chemistry (C)

Those who had the opportunity of attending the sessions of Section C enjoyed a number of both informative and interesting papers. About 66 attended the dinner meeting, at which Randolph T. Major gave an unusually good talk on the topic, "Of food, feed, and drugs."

The Section C program consisted of one session of submitted papers, and six sessions of symposia of somewhat general interest. A contributed paper by Earl B. Working, on the measurement of shrinkage in woolens, arrived too late for inclusion in the printed program.

The symposia sessions were devoted to topics such as: *Comparative nutrition requirements of animal species*, Part I, arranged by Robert S. Harris, and Part II, arranged by Fredrick J. Stare; *Chemicals in food*, arranged by Charles N. Frey; *Recent advances in food technology*, arranged by Bernard E. Proctor; *Growth and nutrition of plants*, arranged by P. W. Zimmerman; and *Chemistry of the sea as related to food problems*, arranged by Harden F. Taylor. One came away with the feeling that he had been well indoctrinated with respect to what the plants, animals, and fish must eat in order that he himself may eat properly.

It is not too early to begin to plan for the meetings of Section C to be held in San Francisco during the holiday season, 1954, and it is not too early to begin to prepare a tip-top paper for presentation at that meeting. One thousand dollars will be awarded for the best origi-

nal paper submitted during the San Francisco meeting of the AAAS.

ED. F. DEGERING, *Secretary*

Alpha Chi Sigma (C1)

Alpha Chi Sigma, a professional chemistry fraternity, held a luncheon meeting at the Hotel Sheraton Plaza on Tuesday, Dec. 29. It was attended by 11 members who represented 9 collegiate and professional chapters. An informal discussion of the current activities of the professional branch of the fraternity was held. These activities include affiliation with the AAAS, with the National Safety Council, and the support of the American Chemical Society Award in pure chemistry.

EDWARD R. ATKINSON, *Program Chairman*

Section on Astronomy (D)

The meetings of Section D had the largest attendance, approximately 150, of any during my four years as secretary. The program consisted of two top-level symposia and the address of the retiring chairman.

The symposium on *Radio astronomy*, organized by Bart J. Bok, began on Saturday afternoon. The first session featured general survey talks. John P. Hagen summarized the solar radio work, and pointed out the differences between the radiation at centimeter and meter wavelengths. Among the important astrophysical results discussed was the confirmation of the predicted limb brightening by high resolution.

Peter M. Millman discussed the advances in radio observations of meteors since the great Giacobinid shower of Oct., 1946, paying particular attention to rates, heights, velocities, orbits, and wind velocities. The detection of daytime meteor showers and of winds in the upper atmosphere with speeds up to 100 mi/hr are important new contributions of this field. The well-supported conclusion that there are no meteors with hyperbolic velocities would seem to be the last word on this controversial question.

Grote Reber, in "Galactic radio waves," gave a general historical survey, beginning with the negative results of Lodge (1894–99) and Nordmann (1905), and the discovery of "cosmic static" by Jansky in 1931. Reber's own work began as a private venture in 1937, and the instrument of diameter 31 ft that he built was the first radio telescope. For the past two and a half years, Reber has been working on the top of Mount Haleakala in Hawaii at an elevation of 10,020 ft. He uses the reflection of the radio waves from the ocean to do interferometry at low frequencies for the study of discrete sources.

Harold I. Ewen, codiscoverer of the 21-cm radiation from interstellar hydrogen, gave a summary of the theoretical background and observational developments in this field.

The second session was devoted to discrete sources. F. G. Smith and B. Y. Mills discussed recent work at Cambridge, England, and at the Radio Physics Laboratory in Australia. Resolving power is the chief problem, and most purposes are best served at wavelengths shorter than 1 m by a large-aperture single antenna. At longer wavelengths, it is better to use interferometric technics. Identifications with astronomical objects have now been suggested for nearly two dozen celestial radio sources. Excluding the moon and sun, these may be classified as normal galaxies, gaseous nebulae within our own galaxy, and abnormal galaxies. Shapes and sizes (ranging from one minute of arc to several degrees) have been measured for 14 sources.

Sunday morning was devoted to an excursion to see the 24-ft radio telescope at the Agassiz Station of the Harvard College Observatory. The "unusual" Boston weather helped to make this trip comfortable as well as interesting.

The Sunday afternoon session began with the address of the retiring chairman of Section D, Charlotte Moore Sitterly, on "Atoms and ions in the sun." Sixty-seven elements have been identified in the sun, of which three are dubiously identified, and one is found only in the spectrum of the solar corona. Rocket spectra, predicted lines, and other useful technics were discussed.

The symposium concluded with a panel discussion of current research projects by: C. Gordon Little, on "Current researches at the Jodrell Bank Experimental Station of the University of Manchester;" Merle A. Tuve, "Radio hydrogen observations at the Carnegie Institution;" John D. Kraus, "The enlarged Ohio State University radio telescope and the program for its operation;" Fred T. Haddock, "Galactic sources measured at λ 9.4 cm;" and A. Edward Lilley, on "21 cm research with the radio telescope at Agassiz Station of Harvard Observatory."

The three sessions of the symposium on the *Origin of meteorites* were held on Wednesday. This stimulating program was organized by H. H. Uhlig and Fred L. Whipple. Participants, including those whose papers were read for them, included H. C. Urey, F. Paneth, C. C. Wylie, F. L. Whipple, R. N. Thomas, E. P. Henderson, S. H. Perry, Harrison Brown, H. H. Uhlig, W. H. Pinson, H. H. Nininger, Walter Wahl, S. K. Roy, Robert K. Wyant, Harmon Craig, George Edwards, Giovanni Boato, and S. F. Singer.

The contributions to the symposium fell for the most part into three principal categories: (1) ages of meteorites; (2) distribution of elements in meteorites; and (3) structure of meteorites. The age determinations from helium are falsified by the effect of cosmic rays, but it is possible to correct for this to a certain extent. Perhaps it may be possible in the future to use the meteorite data to estimate the prehistoric intensity of cosmic rays.

The distribution of elements can be explained if the meteorites are fragments of a planetary body with a mass less than one-tenth the mass of the earth. However, high temperatures and pressures are required to produce some of the observed structures, and a number of technical problems relating to this were discussed by different speakers.

It seemed to be generally agreed that the evidence now at hand leads to the conclusion that the meteorites are the result of a collision between two asteroids. Other than this, there were many differences of opinion about details, and the best way to summarize the symposium is to quote Harrison Brown's remark: "I defy anyone to do that."

The Astronomical League became an Associated Society by action of the AAAS Council. They were represented at the Boston meeting by an exhibit in Mechanics Hall prepared by the Amateur Telescope Makers of Boston.

FRANK K. EDMONDSON, *Secretary*

Section on Geology and Geography (E)

The program of Section E reflected greater participation by the geography membership than heretofore, thus resulting in essentially equal emphasis on sessions of interest to the two sciences. Although general sessions were held for both geology and geography, the principal contribution resulted from symposia on several timely and vital issues. Chief of these was the problem of *Water*

for industry, arranged by the Section and cosponsored by Sections M and P, the Geological Society of America, the New England Division of the American Association of Geographers, and the American Geophysical Union. The problems of water supply for industry, both present and future, were discussed in terms of the available supply, the requirements, patterns of industrial location, disposal of wastes, cleanup of streams, and concepts of overall development and use.

A symposium on *New England geology* focused attention on the numerous problems of stratigraphic correlation, origin and age of igneous and metamorphic rocks, structural geology, physiography, and glacial geology of the New England area.

A symposium on *The metropolis* defined the functions of cities, their commercial patterns, residential patterns, and the spacing of new growth. Factors that may alter past patterns of metropolitan growth, such as new sources of energy, new technologies in utilities, air transportation development, and vulnerability to atomic attack, were analyzed. The need for urban research, which lags far behind rural research, was emphasized.

Symposia, cosponsored by the Section, included *Regional analysis*, arranged by Section K; *The economic state of New England*, arranged by Section E; and *Origin of meteorites*, arranged by Section D.

A highlight of the Section program was the vice-presidential address and smoker, held at the Harvard Faculty Club. The address, by Arthur C. Trowbridge, was entitled "Mississippi River and Gulf Coast terraces and sediments as related to Pleistocene history—a problem." Dr. Trowbridge reviewed the conventional concepts of Pleistocene events and presented several modifications of the range and stands of sea level resulting from glacial maxima and intervening complete deglaciations. Some evidence in the Gulf of Mexico for sea levels considerably lower than the present was discussed. The speaker raised many provocative issues and a lively discussion followed.

JACK B. GRAHAM, *Secretary*

National Geographic Society (E3)

The National Geographic Society's annual lecture, given Dec. 27 by Volkmar Wentzel, was attended by about 3000 persons. Mr. Wentzel's color motion picture, "Into the heart of Africa," was enthusiastically received by the audience. Meredith F. Burrill added greatly to the program with his fine introduction of Mr. Wentzel.

This year, for the first time, a count was made of persons visiting our exhibit. The number was 1600 persons, most of whom actually stopped to talk with John R. Hoopes and E. C. Canova, our representatives. The results greatly surpassed last year's activity.

RALPH GRAY, *Chief of School Service*

National Speleological Society (E4)

The meeting of the National Speleological Society, Dec. 26, presided over by Harold B. Hitchcock, was attended by about 25 members. Six scientific papers were given.

In the first paper, Brother G. Nicholas emphasized the value of caves as archeological sites. In caves in southwestern United States much material relating to prehistoric human culture has been found, dating back to the Folsom period and possibly even beyond. In eastern caves, the chief remains found are of animals, usually Pleistocene. Even caves that have been long known and frequently visited are promising sites, for the remains are often deeply buried.

E. DeBellard Pietri's paper, read by Charles E. Mohr, contained new observations on the Oil Birds, or Guacharos, of the great Guacharo Cave in Venezuela. These large night-flying birds nest in the absolute darkness of this cave and a few others nearby. Formerly slaughtered by thousands for their oil, they are now protected by the government, which in 1949 set aside the cave as "Alexander von Humboldt National Park." Following this, Donald B. Griffin told how these Oil Birds find their way in the dark. He had previously studied the acoustic echolocation system used by bats, and he demonstrated tape recordings and oscillograms of the clicks these birds make as they fly in the dark. Unlike bat signals, these clicks are audible and have frequencies around 7000 cy/sec and lasting 2 to 5 millisec.

The last three papers were on cave bats. President Mohr spoke on the decrease in bat population of caves, noticed in recent years. He presented several theories for the cause of this decrease, but did not choose between them. He did emphasize the scarcity of data and the need for more midwinter bat census work. Peter J. Bels described the large-scale bat banding program being carried out in the old limestone mines of the Maastricht region of the Netherlands, in which one to two thousand bats are banded each winter; bats (*Rh. Ferrum-Equinum*) banded up to 14½ yr before have been found alive. Chairman Hitchcock concluded the meeting with a paper on his studies of the rare Leib's Bat (or Least Bat) which, he found, lives in caves in winter and in crannies in barns in summer.

GEORGE EHRENFRIED

Section on Zoological Sciences (F)

Section F, although not sponsoring a separate meeting at Boston, cooperated most closely in cosponsoring other major scientific zoological programs and symposia. The zoology programs at the Boston meeting were exceptionally well planned and coordinated. The papers and presentations were excellent, and the attendance at most sections was near room capacity. The dinners of the various affiliated zoological societies were well planned and addresses of retiring section chairmen were most stimulating.

Plans and programs for the Berkeley meetings were enthusiastically discussed. Members wishing to present scientific papers or conduct symposia are urged to contact the secretary of Section F so that satisfactory arrangements may be made.

J. H. BODINE, *Secretary*

American Society of Zoologists (F1)

Sessions were held Dec. 28–30. They were highlighted by unusually well attended paper-reading sessions; interest ran high and there was, at times, vigorous exchange of information and opinion.

The presidential symposium on *Bioluminescence as a tool in the study of cell processes*, with John Buck, A. M. Chase, F. H. Johnson, and W. D. McElroy as speakers, and E. Newton Harvey as chairman, was attended by over 400. Many thought it was one of the best in recent years.

The Society was fortunate in having at its annual dinner an address by Paul Weiss, vice president of Section F. He spoke brilliantly of how beauty in nature and in art depend upon orderly pattern with some degree of freedom. The address, entitled "Beauty and the beast: life and the rule of order," was illustrated by examples from nature and from occidental and oriental works of art.

The officers for 1954 are: president, J. Walter Wilson,

Brown University; vice president, Frank A. Brown, Jr., Northwestern University; secretary, S. Meryl Rose, University of Illinois; treasurer, Theodore L. Jahn, University of California at Los Angeles.

S. Meryl Rose, *Secretary*

Society of Systematic Zoology (F4)

The sixth annual meeting of the Society of Systematic Zoology was highlighted by three symposia, the annual book exhibit, and an open house and smoker. So much interest was shown in the contributed papers that the session had to be moved to a larger room.

The election of officers for 1954 was announced as follows: president, Horace W. Stunkard of New York University, by automatic succession; president-elect, Laurence M. Klauber of San Diego, Calif.; secretary-treasurer, Richard E. Blackwelder of Washington, D. C., for a new term of two years; new councillors, Curtis W. Sabrosky of Washington, D. C., and F. A. Urquhart of Toronto, Ont.

Again a major attraction of the meeting was the headquarters lounge of the society, where 518 recent books on many zoological subjects were available for examination at leisure. This is an increase of 180 books over last year, with 20 new publishers involved. Many monographs and new journals were exhibited, including the new edition of the Hassell, *et al.*, *Index-Catalogue of Medical and Veterinary Zoology*, in 18 parts. The 48-page list of books previously exhibited was nearly matched by a 30-page supplement. Many copies of each were distributed.

Membership in the SSZ has now topped 1300. The new Pacific Section of the SSZ has not yet counted the returns from its first circulation, but it hopes to include 200 members next year.

With the cooperation of the Society for the Study of Evolution and the Museum of Comparative Zoology, a very successful open house and smoker was held in the office of the director of the Museum, A. S. Romer. Many old acquaintances were renewed there and many new ones begun.

The annual meeting of the SSZ in 1954 will be held with the AAAS in Berkeley.

R. E. Blackwelder, *Secretary-Treasurer*

American Society of Human Genetics (FG2)

The sixth annual meeting was held Dec. 27–30. The program was well balanced and was composed of excellent papers. There were three morning sessions with short papers and three afternoon sessions devoted to symposia on *Genetic factors affecting intelligence* and *Human genetics and medical education*. Two of the symposia initiated by the Society were shared by other societies; all were well attended.

The dinner and the address by President C. P. Oliver, on "The genetic population," were attended by 115 persons.

The following officers were elected: president, James V. Neel; vice president, A. F. Blakeslee; president-elect, Curt Stern; directors, Ray C. Anderson, H. Bentley Glass, and A. G. Steinberg.

The next meetings will be in Gainesville, Fla., on Sept. 5–9.

Sheldon C. Reed, *Secretary*

American Society of Naturalists (FG3)

The American Society of Naturalists held its 71st annual meeting Dec. 28–30. On Dec. 28, Harold H. Plough presided at the symposium on *Some biological effects of radiation from nuclear detonations*. This symposium was arranged by Alexander Hollaender and was cosponsored by the Genetics Society of America. Subjects and speakers were: "Chromosomal breakage in *Trandescantia*," Alan D. Conger; "The production of chromosome rearrangements in *Drosophila*," E. B. Lewis; "Visible and lethal mutations in *Drosophila*," George H. Mickey; "The effect of neutrons on thymic and circulating lymphocytes of the mouse," Robert Carter, V. P. Bond, James T. Brennan, and E. P. Cronkite; and "Genetic and developmental effects on mice," William L. Russell.

At the annual business meeting, new officers elected were: president, Milislav Demerec; vice president, Ralph W. Chaney; treasurer, Carl P. Swanson (for 3 yr); members of the Editorial Board of *The American Naturalist*, A. S. Foster, Jack Schultz, and G. L. Stebbins (for 3 yr) The next annual meeting will be held with the AIBS in Gainesville, Fla., Sept. 5–9.

On Dec. 29, a symposium arranged by Richard S. Bear on *Physics in biology* was cosponsored by Section B. This symposium was presented in two parts, with Vice President Hollaender presiding at the afternoon session.

The Naturalists dinner was held Dec. 30. In the enforced absence of President L. J. Stadler, owing to illness, his presidential address on "The gene" was read by Bentley Glass. It was a masterful presentation of the subject, with a clear analysis of the known facts discovered through experiment and observation, and of theoretical speculation, awaiting further experiment for verification.

Beta Beta Beta (FG4)

Beta Beta Beta held its biennial convention Dec. 28 and 29. The session Dec. 28 was devoted to preliminary business affairs and planning for the various programs of the society during the next two years.

The session Dec. 29 followed a luncheon at the Sheraton Plaza Hotel. The Convention's speaker was Edmund W. Sinnott, dean of the Graduate School, Yale University, who spoke on "Biology and teleology." Dean Sinnott's address was followed by a plenary session of the society.

Frank G. Brooks, *Secretary*

Genetics Society of America (FG6)

The Genetics Society of America met Dec. 28–30. Seventy-two short papers and 12 demonstration papers were on the program. It was necessary as a consequence to hold concurrent sessions on three half-days. On one morning 6 papers were read on the invitation program; these had been selected by a program committee from among the papers submitted for the general program.

On Dec. 28, the Genetics Society and the American Naturalists spohsored a symposium on *Some biological effects of radiation from nuclear detonations*; and on Dec. 30, the Genetics Society, the American Society of Human Genetics, and the American Society for the Study of Evolution sponsored a symposium on *Genetics and races of man*.

The business meeting was held Dec. 29. Members attending numbered 155. The new officers elected were: J. T. Patterson, president; R. A. Brink, vice president; and N. H. Giles, Jr., treasurer for three years.

Clarence P. Oliver, *Secretary*

National Association of Biology Teachers (FG7)

The meeting of the National Association of Biology Teachers began Dec. 27 with a progress report and plans

for the future of the very active conservation committee. Fifty members, representing regional and state chairmen, took part in this inspiring review of a job well done.

The session Dec. 28 followed the theme of *Human conservation* and stressed recent discoveries in antibiotics, reported by Dale Scholz; narcotic addiction in the United States, by Lois Higgins; and alcohol addiction in the United States, by R. G. McCarthy. This session closed with a panel discussion on *"How to effectively teach units on alcohol, narcotics, and tobacco.*

The Dec. 29 session was on the theme, *Your biology classroom problems*, especially on making biology interesting and practical to the slow learner. Group work followed on a wide variety of problems: field trips, clubs, projects, visual aids, school forest, animals and plants in the laboratory, and proper use of the textbook. All had the pleasure of listening to the reports of each group later in the afternoon.

On Dec. 30 there was a field trip jointly with the ANSS. The biology teachers edited the fine group of materials collected by the conservation committee, Dec. 31 and Jan. 1. It was inspiring to see classroom teachers sacrifice a holiday for a truly professional task.

ARTHUR J. BAKER, *President*

Section on Botanical Sciences (G)

The Section on Botanical Sciences sponsored a two-session symposium on *The uses of large scale algal cultures*, arranged by Barry Commoner, and cosponsored by the New England Section, American Society of Plant Physiologists. This symposium was notable for the quality of its reports and discussions by the mixed panel of academic and industrial investigators and business men.

Section G acted as cosponsor for two symposia. First was the AAAS general symposium on *Species which feed mankind*, arranged by Paul C. Manglesdorf and M. R. Irwin. The first session, presided over by Karl S. Quisenberry, was concerned with plant species and, after a general discussion of the world's principal food species, gave its attention in four papers to maize, America's principal food species. The second session, presided over by Roy C. Newton, approached the problem of animal food species through discussions of agriculture and chemistry, and the roles of nutrition, physiology, and genetics. Section G also cosponsored Section C's symposium on *Growth and nutrition of plants*, arranged by P. W. Zimmerman, which was concerned with chelating materials, soil conditioners, organic sprays, and foliar nutrition—all currently important subjects.

Section G was also host to the Second National Pollen Conference, arranged by Stanley A. Cain and cosponsored by the Ecological Society of America. This conference met in three sessions. The first session was concerned with the important deep profiles from Mexico City and dealt not only with the usual pollen analysis and climatic speculations, but with integrated statistical and petrographic analyses. Fossil maize from the profile came in for special consideration with its identification from pre-archeological levels and studies of pollen variation of it and its relatives. The second session was mostly concerned with palynological problems in Quebec and other northern regions, giving special attention to problems of profile interpretation and the nature of pollen rain and transport. The third session took up problems in palynological technics and ranged from the uses of pollen in genetic studies to its application in coal stratigraphy and the geology of ancient strandlines, from the use of size-frequency in species identification to technics of permafrost study. The pollen conference and the jointly sponsored symposia show a firm belief in the Association's important role in providing for the consideration of trans-disciplinary matters in science.

The section also provided three sessions for the reading of contributed papers and sponsored a dinner for all botanists. On the latter occasion Edgar Anderson, vice president for Section G, spoke on the "Role of hybridization in evolution," in which he emphasized strongly the importance of introgression in producing intraspecific variability.

STANLEY A. CAIN, *Secretary*

Section on Anthropology (H)

The sessions of Section H consisted of 37 papers exclusive of those read by title. There were three symposia and two sessions for contributed papers.

Evon Z. Vogt arranged a symposium on *Theoretical models for the study of culture change*. It included his own analysis, "Some suggestions for a theoretical model for the study of acculturation," mention of which inadvertently had been omitted from the printed program. The other contributions concerned the application of theoretical models in archaeology, linguistics, evolution, kinship, and communication. The audience participated in a discussion of the extent to which the concepts which had been mentioned can be usefully applied in empirical studies.

Douglas S. Byers gathered together, for a symposium on the *Indians of New England*, a group of investigators whose own studies have been in archaeology, ethnology, and history. They described, among other things, the relations of the various Indians of the region with one another and with the colonists.

A symposium of two sessions on *Nonhuman primates and the problems of human evolution*, arranged by James A. Gavan, encompassed the present status of palaeontological, morphological, and psychological knowledge of the primates. Most of the contributions were therefore by nonanthropologists in the narrow sense. However, Ernest A. Hooton, in opening the symposium, and William L. Straus, Jr., in closing it, emphasized the ways in which these studies are significant for understanding human evolution. Dr. Gavan plans to edit this symposium for publication as a single issue of *Human Biology*.

Douglas Haring presided at the annual dinner. Clyde Kluckhohn delivered the vice-presidential address, on "The present position of anthropology." He emphasized the essential importance to any anthropologist of the diverse aspects of the subject, as a social science, as a humanity, and as biology.

The contributed papers were also of wide interest. All fields of anthropology were represented and yet each paper, following the precepts of Professor Kluckhohn's talk of the previous evening, was addressed to anthropology as a whole. Archaeological, linguistic, economic, and sociological aspects were treated in each case in a wider context. One especially noteworthy paper described the teaching of a course in anthropology in which some of the students take the role of informants while others take the role of ethnologists to act out what they are learning; it was amusing to note the similarity between some of the classroom situations which were mentioned and real field experiences.

Approximately 90 to 120 persons attended each symposium, and the other sessions were also well attended.

GABRIEL LASKER, *Secretary*

Section on Psychology (I)

Programs sponsored or cosponsored by Section I on Dec. 27–30 consisted of two general sessions of short, submitted papers and five symposia. One symposium, organized by Burton S. Rosner, included 6 invited papers dealing with the social behavior of animals and men. The speakers surveyed evidence pertaining to insects, lower vertebrates, subprimate mammals, nonhuman primates, and man.

A second symposium, on brain function, was arranged by Walter Rosenglyth; the five papers dealt with effects of anesthesia on evoked potentials, relations between the nervous system and the adrenal cortex, functions of the inferior temporal cortex in visual discrimination, and effects of brain injuries in human beings. E. B. Newman organized a symposium of six papers on sensory processes; topics covered included brightness contrast in pigeons, vibratory sensation in the skin as a basis for communication, a neurophysiological model for olfactory discrimination, scaling procedures for loudness and brightness, and a discussion of the interpretation of neurological models for psychophysical phenomena.

A series of four invited papers on *Human engineering and information theory* was arranged by Leonard C. Mead. These papers were concerned with information theory as a model of the organism, as related to visual displays, as related to display-control relationships, and as it pertains to man-machine systems.

In cooperation with Section H (Anthropology), Section I sponsored 11 invited papers treating primate evolution and behavior. The first session consisted of 8 papers dealing with evidence concerning evolution of primates, including man. The 3 papers of the second session dealt with grouping behavior of nonhuman primates, mental evolution in primates, and the cultural capacity of the chimpanzee.

Together with the Committee for the Study of Animal Societies under Natural Conditions, the American Zoological Society, and the Ecological Society of America, Section I shared the responsibility for a program of submitted papers dealing with a variety of subjects ranging from factors controlling ovulation in barn swallows to the experiential and hormonal control of sexual behavior in male cats.

The remaining open session of submitted papers also dealt with a number of different subjects including investigations of the Rorschach Test, activity levels of young chimpanzees and human psychotics, emotion and coronary disease, and physiological damage resulting from emotional stress.

The vice-presidential address was delivered by Frank A. Beach on the subject, "Development of the individual from conception to conceptualization."

Donald Lindsley was elected vice president of the Section for 1954, and J. C. R. Licklider was elected member-at-large to the Council, to serve for 3 years.

FRANK A. BEACH, *Vice President*

Section on Social and Economic Sciences (K)

Cooperation between the social sciences and other disciplines was the dominant feature of the sessions arranged by Section K at the 1953 meeting. The Section contributed one session to the symposium on the *Scientist in American society*, including papers on the beliefs and expectations of the public and on the social psychology of political loyalty in liberal and totalitarian societies. In cooperation with Sections E and M, Section K joined with the Committee of New England of the National Planning Association in an all-day symposium on *The economic state of New England*. The Committee for Social Physics continued the work begun in earlier years with two sessions dealing with the formulation of general principles of social physics and with indicated areas for the application of social physics.

In cooperation with Section M and with the National Academy of Economics and Political Science, as well as Pi Gamma Mu, a program was arranged dealing with *Scientific research and national security*. A symposium on *The metropolis* was arranged jointly with Section E. The Society for the Advancement of Criminology and the Society for Social Responsibility in Science arranged for sessions on *A scientific approach to the problems of delinquency*.

CONRAD TAEUBER, *Secretary*

AAAS Committee for Social Physics (K1)

The Committee conducted two sessions Dec. 30. The morning session was cosponsored by the Institute for the Unity of Science, with P. W. Bridgman of Harvard University in the chair. Presiding in the afternoon was R. E. Bassett of the University of New Hampshire.

Program speakers were J. Q. Stewart, J. D. Hamilton, S. C. Dodd, G. E. Pendray, J. C. Scurlock, and H. G. Dyke. Thus, contributions were included from an astronomer, a physiologist, a sociologist, a public relations counsel, an engineer, and an attorney. The structure of social physics has developed to the point where integration of an unprecedentedly wide range of phenomena is in sight.

Active discussion from the floor added comments representative of an even more varied spectrum of investigators and scholars. Attendance reached 40. Stuart C. Dodd, Department of Sociology, University of Washington, will arrange a program for the Berkeley meeting.

JOHN Q. STEWART, *Secretary*

National Academy of Economics and Political Science (K2)

The symposium session of the National Academy of Economics and Political Science, held Dec. 29, was arranged jointly with Sections K and M, and with the collaboration of the National Social Science Honor Society, Pi Gamma Mu. The general subject was *Scientific research and national security*. Alan T. Waterman, director of the National Science Foundation, spoke on the role of government in matters pertaining to basic research; he pointed out the need for adequate government support of basic research within definitely defined areas. Mervin J. Kelly, president of the Bell Telephone Laboratories, in discussing the developments in industrial research and their relation to national security, emphasized the preparedness of the United States to meet aggression, realized by the contribution of the research of the free industries of capitalism. J. Carlton Ward, Jr., president of the Vitro Corporation of America, dealt with scientific research and the development of the national economic and industrial potential; his paper indicated the need for progress through scientific research which would maintain not only the nation's economy but also its philosophy, freedoms, and integrity. Clarence E. Davies, chairman of Section M, presided at the session.

Prior to the joint session, a luncheon was tendered by Pi Gamma Mu in honor of the program participants, Section K and M officers, administrative officers of the AAAS, and the officers of the National Academy of Economics and Political Science.

DONALD P. RAY, *Executive Secretary*

Society for the Advancement of Criminology (K4)

A symposium on *A scientific approach to the problem of delinquency* was held jointly with Section K on Dec. 30. In attendance were more than 100 persons, including police officials, probation and parole officers, faculty members of colleges and universities in the area, psychiatrists, and members of the staff of the Senate Committee on Juvenile Delinquency attended the session.

The chairman, Donal E. J. MacNamara, discussed the problem of delinquency in its historical context, discounting both qualitatively and quantitatively much of the present scare mongering, quoting from the literature of past centuries to indicate that "the younger generation has always gone to Hell, and then somehow been reclaimed or rehabilitated to bemoan the rapid descent of their successors to the same region." He attacked current statistics as inaccurate and self-serving. James Brennan discussed the nation-wide juvenile delinquency increase (approximately 25–30 percent) as a police problem. He emphasized the necessity of specially selected and specially trained juvenile police officers, and pointed up the traumatic effect of the usual police-juvenile contact. Great stress was placed on the role of community organizations.

Mahmoud El Sebai, inspector of Egyptian Police, presented an excellent survey of the police-crime problem in Egypt. He pointed out that the postwar period, especially in those areas of Egyptian-English conflict, and the necessary confusion resulting from internal political unrest had created an enormous problem in homeless, unsupervised youth—complicated by poverty and by inadequate public facilities (health, education, police services, institutions). There are no trained juvenile officers and no specially organized juvenile police units but attention is now being directed toward the problem.

Jack Sokol presented the paper of Melitta Schmideberg of the Association for Psychiatric Treatment of Offenders, who was ill. Dr. Schmideberg emphasized the desirability of greatly increased noninstitutional therapeutic facilities, such as outpatient psychiatric care, guidance clinics, improved probation services, and greatly increased recreational and health facilities. Richard O. Arther presented an analysis of 200 juvenile cases before the Chicago courts that were handled by John Reid Associates (polygraph examiners). In each case the ordinarily accepted testimony (usually presented by adults) was enough to show "guilt beyond reasonable doubt." When tested on the Reid Polygraph (lie detector recording cardio-pneumo-psychogalvanic and muscular responses), 89 of these 200 proved innocent (showed no fear reaction on critical questions related to the alleged crimes) and were released. Of 5700 cases handled by Reid and his associates, the factor of known error was 0.0007. This compares with a 2-percent error reported by Russell Chatham in screening tests of AEC personnel.

Michael Cullinane of the Massachusetts State Police led the discussion.

DONAL E. J. MACNAMARA, *Panel Chairman*

Section on History and Philosophy of Science (L)

The program of Section L began with a joint session sponsored by the Philosophy of Science Association and the Institute for the Unity of Science, as well as by the American Academy of Arts and Sciences and the National Science Foundation, in connection with the Conference on the Validation of Scientific Theories. This meeting, as well as other sessions of the Conference, will be described in more detail in *Science*. One hundred and fifty persons were present.

On Dec. 28 a joint session was held with the History of Science Society on *Science and its history—three currents of interpretation*. It was devoted to a discussion of three somewhat different points of view toward the work of the historians of science. Father Joseph T. Clark began by referring to the debt of the history of science in France to the stimulus of Auguste Comte; his paper reviewed the evidence of a lack of true historical knowledge behind Comte's theory of the three stages of intellectual revolution, and developed arguments for the effective coexistence of theological, philosophical, and scientific studies at all periods of human history. David Joravsky presented a detailed analysis of the attitudes toward science expressed in the writings of Marx, Engels, Lenin, and Stalin, and showed how these writings were variously interpreted in the Soviet Union and how these attitudes helped explain the controversies over science, and the attitudes displayed in recent writings on the history of science in Russia. Alexandre Koyré traced the French tradition in the history of science from its origins in the late 18th century, in the work of Montucla, Lalande, Delambre and others; and in the speculations of Turgot, and reviewed the influence which the historical school of philosophy (Duhem, Meyerson, and others) exerted upon the interpretations of the history of science.

On Dec. 29 a joint session was held with Section Q on *Science and general education*. This theme was discussed from different angles by Karl Lark-Horovitz of Purdue, Marston Bates of Michigan, Thomas H. Hall of Washington University, and Kirtley Mather of Harvard. A paper on the same subject was read for Joel H. Hilderbrand of California. The first four speakers discussed the content that they used in actual courses on science intended to serve the general needs of nonscience majors; while Dr. Hilderbrand urged that the "general education" of science majors be made concomitant with (rather than to precede) their work in science itself. Some 65 persons attended this session and there was lively discussion.

The retiring vice-presidential address was given by Richard H. Shryock of the Johns Hopkins University on "Changing concepts in American medicine over three centuries." Dr. Shryock analyzed the concepts of certain medical leaders who were typical of successive eras, and concluded that medical progress advanced in ascending spirals rather than in a straight line. About 45 persons attended.

A session for contributed papers with Richard H. Shryock as chairman was held on Dec. 29. Papers were read on a variety of topics. Charles E. Whitmore spoke on "The language of science," Father William Kane, O.P., on "The naturalistic approach to natural science," and Alden A. Potter, on "Sex in science." A paper by Laura Guggenbuhl on "Karl Wilhelm Fenerbach (1800–1834), mathematician" was read by title only. Father Kane suggested that, in addition to the effective use of quantitative studies of natural phenomena, modern science should also continue to give heed to the Aristotelian concept of qualities "inherent in the nature of things." Mr. Potter discussed the relation of sex to Malthusian viewpoints and to population problems at large.

RAYMOND J. SEEGER, *Secretary*

Section on Engineering (M)

The program included 13 sessions in which 48 papers were presented. One session, developed under the direction of E. F. Murphy of the Veterans Administration, was on

the topic, "Communication aids for the blind." Another session, under the direction of I. P. Orens, Newark College of Engineering, was on the topic, "Highway safety." These sessions were well received and led to four press releases in Boston and New York papers, as well as a radio broadcast over Station WVDA on Dec. 31.

Eleven sessions were cosponsored by Section M and American Book Publishers Council, Conference on Scientific Manpower, National Research Council, and Sections I, N, E, and P.

To advertise the meeting, 7000 programs were printed and mailed to the members of the New England Engineering Society. The Section expresses its thanks to the New England Engineering Society and to Emmart La Crosse of Stone and Webster Corporation for their cooperation in obtaining this publicity.

FRANK D. CARVIN, *Secretary*

Subsection on Medicine (N1)

This subsection cosponsored several symposia with other sections of the society. However, its main effort was the arrangement of a two-day symposium on *Antimetabolites and cancer*, with papers presented on all important aspects of this subject. Sidney Weinhouse began the program with a discussion of "Metabolic fuels in the cancer cell." Major emphasis in succeeding papers was placed on the essential metabolites leading to synthesis of nucleic acids in bacteria, Tetrahymena, and mammalian cells. Agents interfering with the utilization of the nucleic acid precursors were discussed by several speakers. As these antimetabolites soon become ineffective as a result of the development of resistance, Bernard D. Davis, C. A. Nichol, and Howard E. Skipper directed their remarks to a discussion of the mechanisms of resistance. The use of antimetabolites in treating experimental as well as human cancer was reviewed by Sidney Farber and Joseph Burchenal. The most significant recent advances made in this field of cancer chemotherapy were summarized and evaluated by David Goddard and Jacob Furth.

ALLAN D. BASS, *Secretary*

Subsection on Dentistry (N2)

Section N2 held three symposium sessions Dec. 29 in the Harvard School of Dental Medicine. The attendance was 125.

The first session was devoted to *Recent animal experimentations in caries research*, directed by R. F. Sognnaes. P. H. Keyes of Harvard illustrated various types of experimental caries by both polarized and nonpolarized light, and described methods of observing and recording animal caries *in vivo*. The genetic factors of experimental caries, presented by H. R. Hunt of Michigan State College, were based on observations made on 9000 rats over a period of 18 yr. J. H. Shaw of Harvard gave experimental evidence indicating the effects of diet in development and caries rates of animals. The influence of possible salivary factors were outlined by D. Weisberger and A. Schwartz of Harvard; they showed that desalivation of animals increased caries and that the parotid secretion is an important caries inhibitor. In discussing the oral environmental factors, F. Torland of the University of Chicago showed that animals fed by stomach tubes developed no caries. He also described an experiment carried on by the Zoller Institute, in cooperation with Notre Dame University, involving 22 germ-free rats; these rats, fed on a highly cariogenic diet, were entirely caries free. The effects of various metallic and organic compounds in the diet of animals as caries inhibitors were presented by J. Hein of Rochester; he pointed out the wide range of differences in effects on different animals. R. Fitzgerald of NIDR presented data on the effects of antibiotics on animal caries; penicillin and Polymyzin B were most effective in rats.

The second session was devoted to a consideration of *Pathologic disturbances of the dental pulp resulting from dental operative procedures*, under the direction of H. A. Zander of Minnesota. I. Schour of Illinois discussed the rat incisor as an index of local disturbances; he showed microphotographs depicting various pulp degenerations and regenerations following the placement of various types of filling materials in incisor and molar teeth of rats. Similar experimentations on dogs were reported by V. F. Lisanti of Tufts College, who showed the protective effects of cortisone administration. The discussion was continued by Gerrit Bevelander of New York University, who illustrated pulpal changes in the human tooth.

The third session was a symposium on *Periodontia*. The chairman, Cyril D. Marshall-Day of Tufts College, called attention to the rapid increase of periodontal disease and the need for research to meet this problem. Various phases of the problem were discussed by Irving Glickman and Samuel Trusky of Tufts College, L. M. Greebry of Illinois, and David Weisberger of Harvard University.

RUSSELL W. BUNTING, *Secretary*

Alpha Epsilon Delta (N4)

The needs of the medical and dental schools for an adequate supply of well-qualified applicants were discussed at the session of Alpha Epsilon Delta, national premedical honor society, held Dec. 29. About 70 persons were in attendance.

James M. Faulkner, dean of the School of Medicine, Boston University, called attention to the recent sharp decrease in the number of applicants with superior academic records and pointed out the importance of attracting outstanding talent for the medical profession. The number of applicants has been steadily declining for the past several years and there are evidences that some medical schools are now being forced to admit candidates with inferior qualifications, he said. While the problem is not yet acute, the current trend could lead to serious consequences. Dr. Faulkner warned that, as expansion programs now under way are completed and the new medical schools now in the final stages of development are in full operation, there will be an even greater increase in the facilities for medical student enrollment which may well lead to a general shortage of good medical school candidates. In commenting on Dean Faulkner's remarks, Harold C. Wiggers, dean of the Albany Medical College of Union University, echoed the same concern and suggested various ways of attracting competent students to the medical field.

James R. Blayney, director of the Walter G. Zoller Memorial Dental Clinic of the University of Chicago, and Paul K. Losch of the Harvard School of Dental Medicine, pointed out that while the number of applicants to the dental schools has gradually increased, dental education, too, is in need of more well-qualified candidates. Both speakers emphasized that the standards of dental education are being raised continually, with requirements now being of the same high level of undergraduate education and competence as for the medical schools.

In the informal discussion, various spokesmen pointed out that the shortage of competent premedical and pre-

dental students is similar to the problems of the other science areas. It was agreed that all available means should be employed to encourage more outstanding students to enter the scientific field. The problem is becoming acute and should be emphasized throughout the educational system, particularly among high school students.

Alpha Epsilon Delta will hold its tenth national convention at Indiana University, March 25–27. It will include a regional conference on premedical education, which is being organized in cooperation with Indiana University.

MAURICE L. MOORE, *National Secretary*

American Association of Hospital Consultants (N7)

Three addresses were given at the meeting of the American Association of Hospital Consultants, Dec. 30, on the general theme, *The research function of the hospital.* E. M. Bluestone, immediate past president, was in the chair.

Jack Masur, assistant surgeon general, U.S. Public Health Service, in reviewing the "Varieties of laboratory service in hospitals," analyzed the scope of the work and the staffs required in hospitals of different sizes and types. Dean A. Clark, director of the Massachusetts General Hospital, discussed "A hospital research program" as it had been developed at his own hospital. An increasing problem is the mounting indirect costs for research which are not covered by the budgets of various funds made available for specific items of research. Harvey Agnew, professor of Hospital Administration, Toronto University, outlined "Developments in physical and chemical research (including atomic research) that have a relationship to hospital laboratories." The many new developments in the laboratory fields have necessitated more extensive and especially designed laboratories; the use of isotopes, particularly, has required the setting up of special facilities. An excellent discussion was led by Cecil G. Sheps, director of Beth Israel Hospital, Boston.

Officers for 1954 are: president, Harvey Agnew, Toronto; vice president, Jack Masur, Washington; secretary-treasurer, Jacque Norman, Greenville, S. C.; executive members, E. M. Bluestone, New York, and Charles A. Wilinsky, Boston.

JACQUE NORMAN, *Secretary*

American Psychiatric Association (N13)

At the meeting of the American Psychiatric Association, held Dec. 30, five papers were presented: "The genesis of man," Leonard R. Sillman, New York City; "Some emotional uses of money," William Kaufman, Bridgeport, Conn.; "Negative reinforcement, negative cathexis, and anxiety in fantasy," William Seeman, Rochester, Minn.; "Comparative study of recent trends in psychiatric treatment in Europe and the United States," Martha Brunner-Orne, Westwood, Mass.; "Studies with mescaline: electroencephalographic responses following electroshock therapy," Sidney Merlis and Wallace Hunter, New York City.

JACOB E. FINESINGER, *Program Chairman*

Section on Agriculture (O)

The program of Section O dealt, in accord with the location of the meeting, with *Agronomic problems of the northeastern states.* One group of papers considered soil resources, deterioration, and methods of soil conservation and improvement. Another group was concerned with crop production and utilization.

A much increased use of lime was advocated, also a fuller utilization of small grains as a source of fall and spring pasture. The possibility of increased production of hay and pasture through use of improved seed and proper fertilization was pointed out. Emphasis was placed on the fact that this increased yield of hay and grass would meet livestock requirements and leave ample land for the growing of much more corn; it would virtually eliminate the large expenditure now made by farmers for concentrated feed.

The scientific basis for a proper utilization of green manure was presented. Sources of adapted legume seeds, the development of improved strains of hybrid corn, and of disease-resistant potatoes and wheat were discussed. The possible utilization of surplus potatoes for cow feed was also presented.

Attendance was fairly satisfactory but was not commensurate with the quality of the papers presented.

C. E. MILLAR, *Secretary*

Section on Industrial Science (P)

The meeting of the Industrial Science Section, arranged this year in collaboration with *Fortune* magazine and the New England Council, was an unqualified success. The interest of New England businessmen, educators, and scientists in the symposium, *Identification and development of senior executives: contributions of modern science,* was attested in an attendance of close to 200 at the morning session, 180 at the luncheon meeting, and 200 at the afternoon session.

A meeting of the Executive Committee was held Dec. 29. George L. Parkhurst, vice president of the Standard Oil Company of California, was made chairman of the Section for 1954, succeeding Francis Curtis.

American Industrial Hygiene Association (P1)

Joint sessions were held with Sections P and N Dec. 29 and 30. About 100 Association members were in attendance.

Fifteen outstanding papers were given at the three sessions. Most of the papers were based on research, although several review papers were included. The paper on "Effects of combinations of sulphuric acid mists and sulphur dioxide on guinea pigs," by Mary Amdur of the Harvard School of Public Health, created much interest because of the implications of connection with the smog problem.

Officers elected for the New England Sessions of the American Industrial Hygiene Association were: president, Robert Thompson, General Electric Co., Lynn, Mass.; secretary-treasurer, Arthur Houghton, Liberty Mutual Insurance Co., Boston.

WILLIAM M. PIERCE, *Program Chairman*

Section on Education (Q)

The program of Section Q, Dec. 27–30, consisted of 10 sessions and in addition two joint sessions; one was with the AAAS Cooperative Committee on the teaching of science in the high school and one was with Section L on the place of science in general education. The lowest attendance at any session was about 30.

Of the sessions of Section Q, one was sponsored and arranged by the American Educational Research Association, through G. V. Lannholm. There were two sessions of contributed papers by members of the section and two sessions of "first" papers by younger persons upon in-

vitation. There were four symposia. One of these, *On the prediction of child development and its educational implications,* was arranged by J. R. Wittenborn of Yale; among other things, the value of tests as single criteria of prediction of infants was severely discounted. A panel discussion on *Why teachers do or do not use films,* arranged by Mark A. May of Yale, revealed that many of the reasons usually accepted for failing to use films are not the real ones. Neither availability nor sex of the teacher are important conditions.

A third symposium was arranged by D. D. Durrell and was continued by him in his address as chairman of the Section. This related to difficulties in learning among normal children. Careful researches emphasizing individual problems were presented. A symposium on industrial efficiency, which has been conducted at the meetings for the past several years, was continued with a large attendance and active interest. This was arranged by N. F. Stump.

D. A. WORCESTER, *Secretary*

AAAS Cooperative Committee on the Teaching of Science and Mathematics (Q1)

In a symposium on *The next generation of young scientists and their science teachers,* held jointly with Section Q on Dec. 27, the speakers discussed two facets of the topic, namely, the critical shortage of scientists and mathematicians facing the United States in the years ahead, and the procedures by which the shortage might be alleviated. Fletcher G. Watson of Harvard University reported on the conclusions of the Harvard Conference held during the summer of 1953; he pointed out that the critical shortage in the years ahead will be found not only in the supply of scientists and mathematicians but also in the supply of teachers available for training them.

The methods for increasing the available supply of trained personnel were discussed from two viewpoints. Miss Jacqueline V. Buck of Grosse Pointe, Mich., defended the single-track approach for teaching science and mathematics in the schools. Hugh R. Templeton, supervisor of science of The University of the State of New York supported the double-track approach. The first approach considers the specialized science courses such as physics and chemistry as extensions of a general education program in science required of all students. The double-track approach suggests that two types of students are now attending high school—the college-bound type and those for whom high school is a terminal point. For the college-bound group a program of science is developed which includes biology, chemistry, physics, and earth science. For the noncollege bound students, a two-year sequence is prescribed—one year of biological science and another year of physical science.

While no unanimity of opinion was attained, both speakers agreed that further study was needed to clarify the problem, and that the proponents of both systems had the same fundamental objective, namely, increasing the supply of scientists and mathematicians.

MORRIS MEISTER, *Program Chairman*

National Science Teachers Association (Q3)

The National Science Teachers Association appreciated the opportunity to hold another of its regional conferences in conjunction with the Boston meeting. The local committee, under the chairmanship of John G. Read of Boston University, developed an unusual type of program and the sessions were well attended. One of the highlights was the group-dynamics approach to the question, "What does an effective science teacher *do*?" Eight small groups discussed aspects of the question and reported back to the large group. The composite report will appear in an early issue of *The Science Teacher.*

A demonstration lesson in the teaching of elementary school science was attended by nearly 300 elementary teachers. As usual, the "Here's how I do it" sessions were among the most popular program features, emphasizing as they do the workbench technics and materials of the science teacher.

The NSTA Executive Committee held one meeting that lasted from 7:30 P.M. until 1:15 A.M. Important actions taken included: (1) approval of certain projects suggested by the publications committee; (2) final approval of plans for the Association's 1954 national convention, Chicago, Apr. 1–3; (3) approval for regional conferences to be held in October at the University of Oklahoma Biological Station, Lake Texoma, and on Dec. 27–30 at Berkeley. The treasurer's report indicated a bright outlook for the year and the membership report revealed the highest NSTA enrollment yet attained, 6767 members and subscribers as of Dec. 15.

The 1954 action program of the Future Scientists of America Foundation was explained during the "Reports from inside NSTA" session. Emphasis during 1954 will be on improvement of the laboratory aspect of science instruction, preparation of a booklet on "A career as a science teacher," and a program to encourage summer employment of science teachers in science-based industries.

ROBERT H. CARLETON, *Executive Secretary*

The Academy Conference (X1)

The annual meeting of the Academy Conference was attended by 45 persons, 38 of whom were the official delegates of 30 of the 41 active academies of science affiliated with the AAAS. This attendance constitutes a new record of representation, both as to delegates and academies. At the business meeting reports of the Committee to Study Cooperation among the Academies of Science, presented by Austin R. Middleton, and the Committee to Study Cooperation between the Academies of Science and the Academy Conference, presented by F. E. E. Germann, were adopted. Amendments to the constitution and a set of by-laws, proposed by a committee headed by Clinton L. Baker, were approved. It was voted to appoint a committee to study public relations in the matter of attitudes towards science, and also a committee composed two subcommittees to study activities and operations of junior and collegiate academies. The officers for 1954 are: Leland H. Taylor, president-elect; Wayne Taylor, president; Percival Robertson, retiring president; and Shirley P. Miller, secretary-treasurer.

Following the business session, three-minute reports from delegates of 28 academies informed the Conference of recent significant accomplishments and activities. Three panel presentations followed by round-table discussions occupied the afternoon session. These were centered around the following topics: Opportunities of secretaries to serve their respective academies; Opportunities of academies to serve the high school teacher; and Opportunities of academies to serve the general public.

The Academy Conference, through its standing committee appointed for the purpose, sponsored the Juinor Scientists Assembly, under the chairmanship of Elbert C. Weaver.

LELAND H. TAYLOR, *Secretary*

American Book Publishers Council and American Textbook Publishers Institute (X3, X6)

The symposium on *Transmission of ideas*, held jointly with Section M, brought to an audience of over 100 people a kaleidoscopic view of some of the exciting new ideas and developments in the realm of communication. Richard Thornton, editor of the College Department of Ginn and Company, presided at the morning session, and Bradford Wiley, vice president of John Wiley and Sons, presided in the afternoon.

Rudolf Flesch of New York University, in discussing writing, emphasized the value of redundancy and the importance of eliminating "semantic noise." Ralph Buchsbaum of the University of Pittsburgh discussed the effective use of illustrations to convey ideas and to repeat and supplement material in written form. The fascinating possibilities of the Photon, the electronic typesetting machine, were reviewed with illustrations by S. H. Caldwell of M.I.T. Leonard C. Mead of Tufts College explained the use of peak stress format in typesetting, which has resulted in as much as a 20-percent increase in reader comprehension. Finally, Carroll V. Newsom of The University of the State of New York outlined the opportunities offered by radio and television, especially the latter, for communicating ideas and in general education.

It is seldom that five papers in a symposium of this sort prove so consistent with one another and so well coordinated without prior planning. The speaker often asked one of the other speakers to comment on questions from the audience, since questions stimulated by one paper frequently had direct bearing on the subject matter of other papers. The liveliness and discernment of the questions asked after each paper were a tribute both to the quality of the audience and to the interest and effectiveness of the papers themselves.

WILLIAM E. SPAULDING
JOHN A. BEHNKE

American Geophysical Union (X4)

The 31st regional meeting of the American Geophysical Union was held Dec. 28–30. On Dec. 30, a program of 14 papers, covering the fields of terrestrial magnetism and electricity, oceanography, meteorology, hydrology, geodesy, and seismology, was presented. The speakers represented such institutions as the Geophysics Research Directorate of the Air Force Cambridge Research Center, Woods Hole Oceanographic Institution, Lamont Geological Observatory of Columbia University, Wayne University, Harvard University, Massachusetts Institute of Technology, and the commercial firm of Wallace E. Howell Associates.

The morning session, under the chairmanship of Edward H. Smith, director of the Woods Hole Oceanographic Institution, was quite varied, with participation by four of the eight sections of the AGU. The afternoon session, under James A. Peoples of the Air Force Cambridge Research Center, was devoted almost exclusively to seismology.

Between 22 and 30 geophysicists were present during the morning session. During the afternoon, attendance varied between 45 and 60. The program committee was pleased and honored to have in attendance the Rev. James B. Macelwane, S.J., and Dr. John Putnam Marble, national president and general secretary, respectively.

The AGU was also cosponsor for the symposia on the *Physics of the upper atmosphere* on Dec. 28, the *Sea frontier* on Dec. 29, and *Water for industry* on Dec. 29.

The 35th annual meeting of the AGU will be held on May 3–5 in Washington, D. C.

WALTER BAGINSKY, *Secretary, Program Committee*

American Nature Study Society (X5)

The sessions of the American Nature Study Society were well attended and challenging. In the opening session, Dec. 26, on *New technics in nature photography*, the camera gun, stroboscopic flash, and 3-D photography were discussed. In the evening the members had an opportunity to admire the camera skill of their president, Roger Tory Peterson, when they previewed his film record of a 3000-mi trip on the North American continent. This trip was taken last summer in the company of James Fisher, British ornithologist and editor, who had been Dr. Peterson's host on his 1952 trip to study European birds. A total of 602 birds were seen by Dr. Peterson on the North American tour; this is the best record for North America in any one year, exceeding Guy Emerson's record of 497 birds in 1940. After the film showing, members had a chance to demonstrate their skill by kodachromes on various subjects.

Other programs dealing with nature activities, forms of publicity and nature education, nature study for everyone, and the practical application of ecology rounded out the meetings.

The joint National Association of Biology Teachers and American Nature Study Society field trip to the north shore of Massachusetts was held Dec. 30. There persons interested in ornithology enjoyed watching 44 different species of birds on the ocean, the shore, and in the Parker River National Wildlife Refuge. Other members of the group devoted their time to exploring the tide pools, the beach, and the dunes. The trip was planned by C. Russell Mason of the Massachusetts Audubon Society and skillfully led by Ruth Emery, Mary Lea Grimes, C. Russell Mason, Charles Mohr, E. Laurence Palmer, Roger Tory Peterson, William G. Vinal, and Richard Weaver.

Officers of the American Nature Study Society are: president, Ruth Hopson, Eugene, Oregon; vice president, Richard Weaver, University of Mich.; treasurer, Gilbert Mouser, Okemos, Mich.; secretary, Helen B. Ross, State Teachers College, Fitchburg, Mass.

Conference on Scientific Editorial Problems, II (X8)

The attendance at the second Conference on Scientific Editorial Problems, on Dec. 27, was indicative of a vital interest in such matters among authors, editors, and publishers. The records showed an increase of 125 percent over the attendance at the first Conference, held in St. Louis in 1952.

Leading editors and publishers discussed topics which were of general interest to all persons in the audience. W. Albert Noyes, Jr., editor of the *Journal of the American Chemical Society*, spoke on "Probable trends in scientific publications as viewed from the editor's office." Milton O. Lee, managing editor of the *American Journal of Physiology*, *Journal of Applied Physiology*, and *Physiological Reviews*, discussed "Problems in financial management of scientific journals." George S. Tulloch, editor of the *Bulletin of the Brooklyn Entomological Society*, reviewed "Problems of the editor of a small journal."

Ruth C. Christman, acting executive editor of *Science* and *The Scientific Monthly*, discussed "Illustrations for scientific publications." Richard M. Hewitt, Division of

Publications, The Mayo Clinic, explained "Exposition as applied to medicine: some of the difficulties." Joseph D. Elder, science editor, Harvard University Press, presented "Jargon, good and bad." Ralph Smith, vice president and editorial director of McGraw-Hill Publishing Company, spoke on "Publishing as applied science." Ralph R. Shaw, Librarian, U.S. Department of Agriculture, discussed "Electronic handling of scientific information." A lively discussion followed the addresses.

The Conference on Scientific Editorial Problems will meet again with the AAAS in 1954.

MARIAN FINEMAN, *Chairman*

Conference on Scientific Manpower, III (X9)

The third Conference on Scientific Manpower continued the practice of recent Association meetings in devoting some sessions to existing problems relating to scientific manpower in the fields of physical, biological, engineering, and social sciences. This year's sponsors included the Engineering Manpower Commission, the Scientific Manpower Commission, the National Research Council through its Office of Scientific Personnel, the National Science Foundation, and Section M.

The Conference was held in three sessions, Dec. 28 and 29. The first two sessions dealt with *The present situation respecting scientific and engineering manpower.* The need for science teachers was treated by Fletcher G. Watson; industry's needs for scientists and engineers, by M. M. Boring; and Selective Service policy, by Joel P. Griffing. James M. Mitchell spoke on military requirements, and John F. Hilliard on defense mobilization requirements aspects. A summary and evaluation of all these papers was presented by Dael Wolfle. The two sessions were chaired by Howard A. Meyerhoff and Alan T. Waterman, respectively.

The Dec. 29 session was devoted to consideration of *The utilization of specialized manpower abroad.* Papers on Germany were read by Richard T. Arnold, on Canada by William R. Dymond, on the United Kingdom by W. A. Macfarlane, and on Russia by M. H. Trytten. Detlev W. Bronk presided.

Papers are now being collected for publication by the National Science Foundation. It is hoped that the Conference may become a regular feature of the AAAS annual meetings, and afford a forum for timely consideration of topics of importance to those concerned with scientific and engineering manpower.

THOMAS J. MILLS, *Program Chairman*

National Association of Science Writers (X11)

The annual winter meeting of the National Association of Science Writers, held Dec. 28, was one of the largest in its history. Perhaps the most important matter brought up during discussions of current and projected activities was a special Founder's Day celebration to be held during the fall of this year, and marking the 20th anniversary of the Association. The celebration will be a full-scale affair and will honor the charter members. Plans are under way to invite national and industrial leaders, as well as American and foreign scientists, and it is probable that important phases of the affair will be conducted in cooperation with the AAAS and its Council. Further developments will be communicated to *Science* as they occur.

Preceding the business meeting, more than 125 members and their guests were present at a reception and dinner arranged by M.I.T. and President James Killian. After the meeting, the group attended a symposium, *Science and the public,* at which there was free and open (but off-the-record) discussions of past, present, and future science reporters. The speakers were: Richard H. Bolt, director of Acoustics Laboratory, M.I.T.; Dean W. C. White, vice president of Northeastern University; Duncan MacDonald, dean of Graduate Studies, Boston University; and Paul Bartlett, professor of chemistry at Harvard University. Louis M. Lyons of the Nieman Foundation presided.

JOHN E. PFEIFFER, *Secretary*

The Scientific Research Society of America (X16)

The annual convention of The Scientific Research Society of America (RESA) was held on Dec. 29. Among other items of business, the following new members of the governing board were elected for three-year terms beginning July 1: Albert J. Phillips, director of research, American Smelting & Refining Co., South Plainfield, New Jersey; Harold Vagtborg, president, Southwest Research Institute, San Antonio, Texas; and Philip M. Morse, Physics Department, Massachusetts Institute of Technology.

The annual RESA address was given by David B. Steinman, his subject being "Suspension bridges—the aerodynamic problem and its solution." Following the address, the $1000 William Procter Prize for Scientific Achievement was awarded to Dr. Steinman.

DONALD B. PRENTICE, *Director*

United Chapters of Phi Beta Kappa (X18)

The annual address of the United Chapters of Phi Beta Kappa was delivered Dec. 30 by Leonard Carmichael of the Smithsonian Institution. His subject was "Science and social conservatism." Kirtley F. Mather of Harvard University presided. There were more than 400 in attendance; the lecture was followed by a lively and extended discussion.

CARL BILLMAN, *Secretary*

Association Finances and Membership

Hans Nussbaum
Business Manager, AAAS

CONDENSED statements of Association finances for the year 1952, prepared by the auditing firm of G. P. Graham & Company, are published herewith, in order that the entire membership may be fully informed regarding the financial operations, obligations, and resources of the AAAS.

The first two statements summarize operating receipts and expenditures. Once again the annuity payments to the Cattell estates for *Science*, were drawn from the excess of receipts over expenditures in the operating account. The remainder of the excess is available as a reserve against future annuity payments, which included a stipulated amount of $17,567.95, plus an inflation adjustment that would total $15,510.74, if computed at the 1952 rate.

The last two statements summarize the status of investment and trust funds. The value of investments and the amount of investment income both increased to a gratifying extent in 1952, thanks to sound investment policies and management, but the total endowment is still meager in comparison with the magnitude of the responsibilities the Association should assume in advancing science.

Washington 5, D.C.
July 29, 1953

To the Council of the
American Association for the Advancement of Science
Washington, D.C.

We have examined the balance sheet of the Operating Fund of the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE as at December 31, 1952, and the statement of receipts and expenditures for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying statements as supplemented by the notes thereto present fairly the financial position of the Operating Fund of the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE as at December 31, 1952, and the results of its operations for the year then ended.

G. P. GRAHAM & COMPANY
By H. A. O'Neill

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
OPERATING FUND

BALANCE SHEET AS AT DECEMBER 31, 1952

Assets

Current assets		
Cash in banks	$196,869.71	
Accounts receivable	25,724.86	
U.S. Treasury bills	358,232.85	
U.S. Treasury bonds	244,609.38	$825,436.80
Other assets		
Deposit with airline		425.00
		$825,861.80

Liabilities

Current liabilities		
Accounts payable		$ 64,489.47
Deferred income		
Prepaid dues and fees	$213,536.11	
Prepaid journal subscriptions	50,987.13	
Contributions 1954 meeting	1,250.00	265,773.24
Reserve fund		250,000.00
Unallocated funds		
Balance Jauary 1, 1952	$182,740.80	
Add: Excess of receipts over expenditures	112,858.29	
	295,599.09	
Deduct: Transfer to building fund	50,000.00	
Balance December 31, 1952		245,599.09
		$825,861.80

Note: The journal *Science* was acquired in 1944 at a stated cost of $166,430.69, payable over a period of ten years, together with such additional amounts as may be determined each year under the inflation clause of the contract. Total payments to December 31, 1952, amounted to $236,480.53. No liability has been shown on the above statement for the balance of $17,567.95 which is payable on the stated cost price of the journal. The amount due under the inflation clause on the balance of the contract computed at the 1952 rate would amount to $15,510.74.

American Association for the Advancement of Science
Operating Fund

Statement of Receipts and Expenditures for the Year Ended December 31, 1952

Receipts			
Dues and entrance fees			$281,975.49
Journals			
Subscriptions			
From Treasurer's accounts (Life, 50-year, and emeritus members)	$ 3,100.50		
Members' special subscriptions	17,933.66		
Non-member subscriptions	61,485.34	$ 82,519.50	
Advertising		155,695.73	
Miscellaneous sales		4,556.54	242,771.77
Publications			
Binders		$ 1,552.20	
Symposium volumes		7,909.53	
Grants for symposium volumes		2,400.00	
Proceedings and directory		580.94	12,443.67
St. Louis meeting and exhibit			29,528.44
Rental income			3,198.52
Income from investments			11,487.98
Miscellaneous			821.32
			$582,227.19
Expenditures			
Administrative and general expense		$ 68,133.70	
Building expense		5,837.41	
Executive committee		6,184.44	
Allowance to divisions		6,483.00	
Section expense		4,114.81	
Circularization—New members		11,523.60	
Meetings and exhibits		33,667.35	
Journals		281,654.45	
Publications		10,376.93	
Employees' retirement plan		8,217.25	
Social security		1,072.64	
Miscellaneous		766.14	
Annuity			
1952 *Science* annuity	$ 16,643.04		
Inflation allowance on annuity	14,694.14	31,337.18	469,368.90
Excess of receipts over expenditures			$112,858.29

Washington 5, D.C.
July 29, 1953

To the Council of the
American Association for the Advancement of Science
Washington, D.C.

We have examined the balance sheet of the Treasurer's accounts of the American Association for the Advancement of Science as at December 31, 1952, and the statement of cash receipts and disbursements for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying financial statements present fairly the financial position of the Treasurer's accounts of the American Association for the Advancement of Science as at December 31, 1952, and the cash receipts and disbursements for the year then ended.

G. P. Graham & Company
By H. A. O'Neill

American Association for the Advancement of Science
Treasurer's Accounts

Balance Sheet as at December 31, 1952

Assets

Endowment and reserve funds			
Securities			$308,747.69
Building fund			
Cash		$ 25,625.41	
Securities		12.50	
Real estate			
1515 Massachusetts Avenue	$ 59,334.15		
Others	93,963.05	153,297.20	178,935.11
Newcomb Cleveland prize fund			
Securities			25,451.99
Current funds			
Cash		$ 12,016.77	
Due from other funds		15,749.42	27,766.19
			$540,900.98

Liabilities and Reserves

Endowment and reserve funds			
Due to current fund		$ 15,297.43	
For research		122,716.15	
For general purposes		105,912.82	
For special purposes		9,025.00	
Treasurer's reserve fund		55,796.29	$308,747.69
Building fund			178,935.11
Newcomb Cleveland prize fund			
Due to current fund		$ 451.99	
Principal of fund		25,000.00	25,451.99
Current funds			
Liabilities			
Academy grants	$ 2,994.30		
Special academy grants	350.00		
Sociology prize fund	3,000.00		
Westinghouse science writers award fund	1,110.55		
AAAS—UNESCO fellowship fund	53.50	$ 7,508.35	
Unappropriated income			
For research	$ 4,371.49		
For general purposes	3,760.01		
Jane M. Smith fund	428.88		
Luella A. Owen fund	17.88		
A. G. Stillhamer fund	544.38		
Unexpended balances of previous years	11,135.20	20,257.84	27,766.19
			$540,900.98

AAAS Membership

1. *Changes during 1953*

New members		5,017
Deaths	356	
Resignations	1,831	
Automatic Resignations	2,767	
Total outgoing		4,954
Net increase during 1953		63

2. *Totals as of 31 December 1953*

Paid for 1953	33,299
Paid through June 1954	10,076
Life members, etc.	740
In good standing	44,115
In arrears	2,760
	46,875
New for 1954	1,928
Total membership	48,803

American Association for the Advancement of Science
Treasurer's Accounts

Statement of Cash Receipts and Disbursements for the Year Ended December 31, 1952

Cash balances January 1, 1952			$ 80,646.06
Receipts			
Endowment and reserve funds			
Life membership fees	$ 2,550.00		
Income added to reserve fund			
Interest and dividends allocated	1,647.65		
Gain on sale of securities	8,162.15		
Redemption and sales of securities	132,825.67		
Gift—Friends of the Association	5.00	$145,190.47	
Building fund			
Contribution	$ 25.00		
Transferred from unallocated funds of Operating Fund	50,000.00	50,025.00	
Newcomb Cleveland prize fund			
Transferred from income for general purposes for balance of thousand dollar prize	$ 61.60		
Income from investments	873.67		
Gain on sale of securities	64.73		
Redemption and sale of securities	3,649.94	4,649.94	
Current fund			
Contributions received for			
Special academy grants	$ 400.00		
Prize in sociology	1,500.00		
Westinghouse Science Writing Awards fund	6,206.63		
Income from investments	10,102.12		
Deceased emeritus life membership fees	700.00	18,908.75	218,774.16
			$299,420.22
Disbursements			
Endowment and reserve funds			
Fees of deceased emeritus life members transferred to Jane M. Smith fund income	$ 700.00		
Securities purchased	172,908.32	$173,608.32	
Building fund			
Architect's fees	$ 36,458.00		
Other expenses	$ 2,523.36	38,981.36	
Newcomb Cleveland prize fund			
Thousand dollar prize	$ 1,000.00		
Securities purchased	29,101.93	30,101.93	
Current fund			
Westinghouse Science Writing Awards fund	$ 6,945.19		
Transfer to Newcomb Cleveland prize fund	61.60		
Income allocated to Treasurer's reserve	$ 1,647.65		
Special academy grants	250.00		
Academy grants	3,738.20		
Emeritus life members (Income—Jane M. Smith fund)	1,350.00		
Journal subscriptions (Life, 50-year, and emeritus members)	3,100.50		
Sociology prize	1,000.00		
A. G. Stillhamer grant	500.00		
Expenses	493.29	19,086.43	261,778.04
Cash balances December 31, 1952			
For building fund		25,625.41	
For current purposes		12,016.77	37,642.18

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The Future of the AAAS

In 1951 a group of AAAS officers and members met at Arden House to discuss the future of the Association. The report of that meeting [*Science*, Nov. 2, 1951; *Sci. Monthly*, Nov. 1951], which has come to be known as the Arden House statement, pointed out the general directions of AAAS development which its authors considered desirable. The report was approved by the Council "as a guide in the formulation of policy." The next step—and one to be emphasized in 1954—is to get down to a more concrete level, one sufficiently specific to permit agreement, or disagreement, on proposed policies and actions. The Arden House group recognized this necessity in writing: "Once a clear and agreed framework of policy is established—and really not until then—effective approach can be made to the problems of instrumentation of policy."

Since the Arden House statement appeared, many members have set down their ideas and recommendations in letters to the Association's officers. There is in those letters much enthusiasm and little criticism of two points made by the Arden House group: (1) AAAS should take a more active role in inter-science affairs, in keeping the members of one science acquainted with developments in other sciences, in considering topics of interest to all scientists; and (2) AAAS should try more actively to explain science to the public and to help create and maintain social conditions under which science can be of greater benefit to society.

On another point there was no unanimity. The Arden House statement suggested that detailed research findings might better be presented at more specialized meetings than at AAAS sessions. This suggestion was supported by some members, but others made it the target of some fairly acid comments. Most scientists want to talk about, hear others talk about, and read about their own specialty. Zealous devotion to a field of investigation is an expected and desirable, perhaps even a necessary, characteristic of a good scientist. True, some are also interested in legislation, in scientific manpower, in relations with society and government, in the philosophy and sociology of science, and in other topics of general importance. But these are secondary interests more frequently than primary ones. People who are interested in science in general are outnumbered by those who are interested in individual branches of science. Some members suggested that the AAAS must cover both types of interest. For example, programs scheduled by the AAAS itself might be on general problems, while the concurrent sessions of affiliated societies might be on more specific research progress. One member summarized: "The AAAS is large enough and strong enough to cultivate both breadth and depth."

Whatever the future character of the Association, change is bound to be gradual. It cannot be more rapid than the members approve. But change is also inevitable. As society changes, the role, the obligations, and the problems of science and scientists change. If the AAAS is to live up to its name it must keep abreast, and even ahead, of some of the changes.

The questions which were debated at Arden House are still before us. The answers, whatever they turn out to be, will have to be approved by a majority of the members. That is the only democratic possibility. It is also the only practical one, for to be effective any program of the Association must have the support and cooperation of a large membership.

DAEL WOLFLE
American Association for the Advancement of Science

SCIENCE, founded in 1880, is published each Friday by the American Association for the Advancement of Science at Business Press, Lancaster, Pa. Entered at the Lancaster, Pa., Post Office as second class matter under the Act of March 3, 1879.

All correspondence should be addressed to SCIENCE, 1515 Massachusetts Ave., NW, Washington 5, D. C. Manuscripts should be typed with double spacing and submitted in duplicate. The AAAS assumes no responsibility for the safety of manuscripts or for the opinions expressed by contributors.

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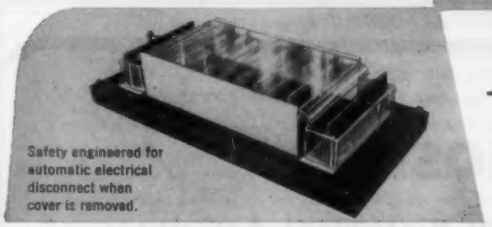

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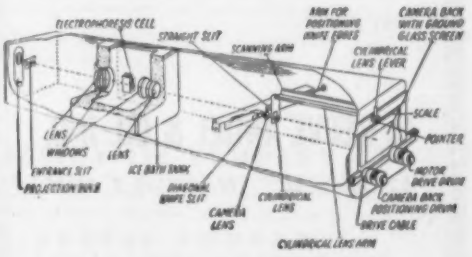

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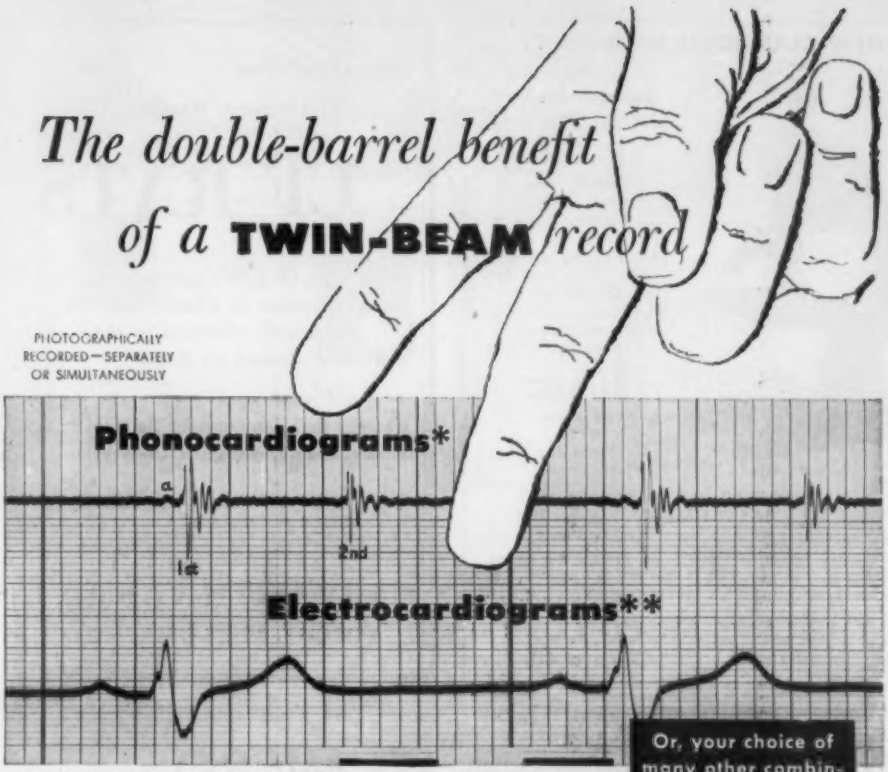

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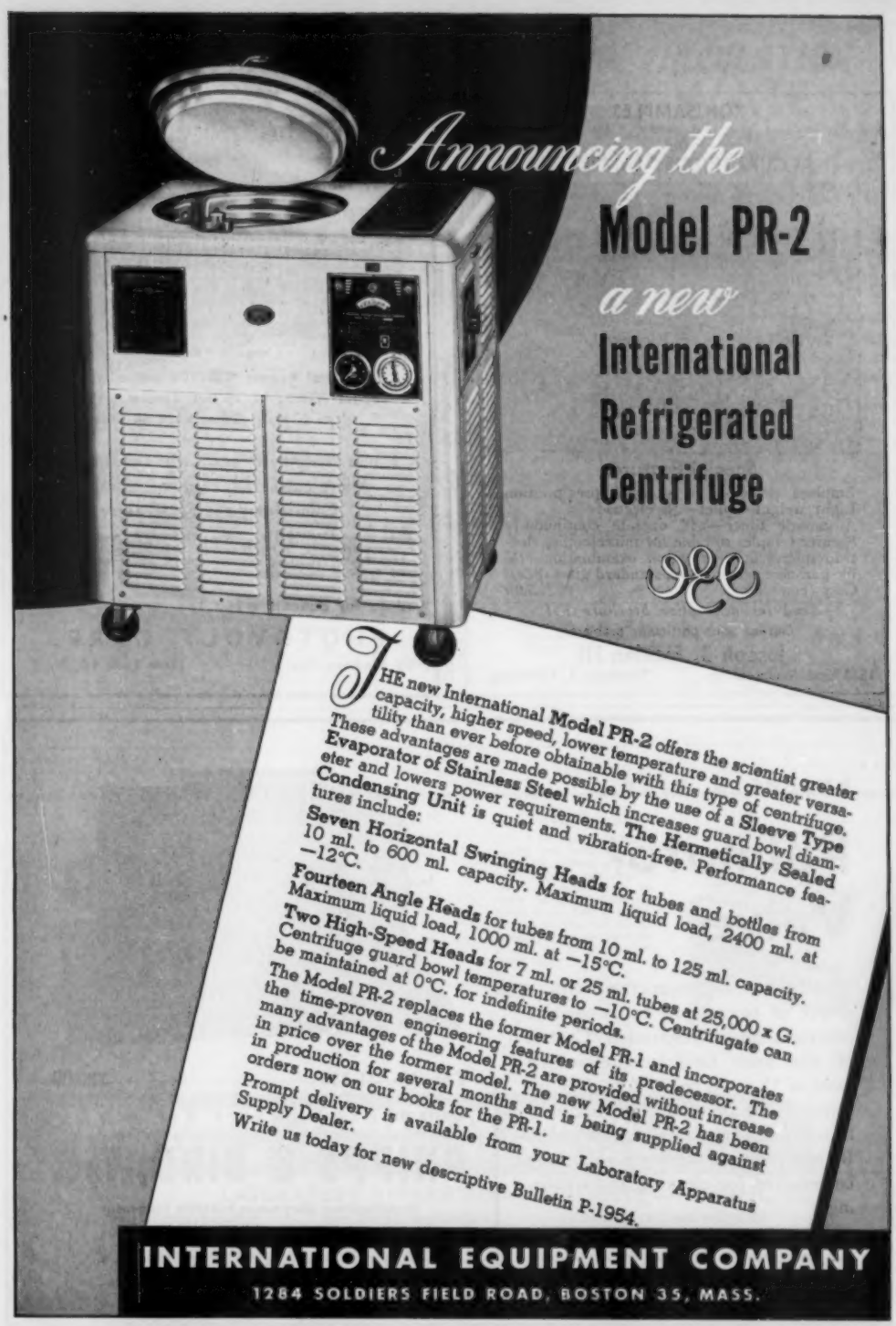
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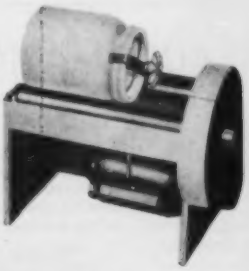

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Cat. No.	No. of Jar	Length	Width	Height	Motor H.P.	Price
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Phase microscopy in the news

Our Phase Microscope Exhibit at the AAAS Meeting received an unexpected bit of advance assistance with the announcement in November that Dr. F. Zernike was awarded the 1953 Nobel Prize in physics for his development of the phase microscope. As a result of this announcement, many who attended the Boston Meeting knew more about phase microscopy than would otherwise have been the case. The phase microscope is so relatively new, and the conventional phase instruments so expensive, that real familiarity with this latest development has been largely limited to an inner circle of zoologists for whom the phase microscope is an absolute necessity. This is an unfortunate situation since phase microscopy has an equally wide application in large areas of industrial research, in routine medical and laboratory testing, and in the student laboratory.

Phase microscopy in a nutshell

Briefly stated, the phase microscope permits the examination of thin, transparent specimens whose structural details vary only slightly in thickness, absorption, and refractive index from their surrounding medium. With the ordinary "bright field" microscope, such specimens must be stained in order to introduce contrast and detail. Aside from requiring skill and laborious preparation, staining techniques produce a physical distortion of the object and involve the death of living specimens. For the zoologist the importance of the phase microscope lies in its ability to show activities in the *living* cell.

Busy booth

The microscopes on display in our booth at the AAAS Meeting ranged from UNITRON Student Models to the large UNITRON Universal Camera Microscope. The constant stream of visitors showed greatest interest in trying for themselves the new UNITRON Phase Microscopes. Two microscopes of each model were placed side by side with one instrument functioning as a phase microscope and the other as a conventional bright field type. The *unstained* specimen viewed was the same in both cases—*somatic chromosomes of Trillium kamtschaticum,* if you're interested. Observers were astounded by the difference between the two images. The demonstration was actually *too* successful; the image under bright field was so washed out in appearance that we were frequently challenged to prove that we really had a specimen on the slide. It took but a moment to change the microscope from bright field to phase contrast, and the observer from a state of scepticism to one of admiration.

Phase contrast for the amateur

To those acquainted with the cost of conventional phase microscopes and unacquainted with the new UNITRON Phase Microscopes, it will seem that the word "wealthy" has been omitted from the above section heading. But it's true—we have a *complete* student phase microscope with 3 objectives and 2 eyepieces, magnifying 32-600X, available for as little as $99. We are rather proud of the report on this instrument given by Professor Julian Corrington in the February issue of *Nature Magazine*. In his column, "Under the Microscope", he states: "Our first reaction on reading advertising material describing phase-contrast microscopes in the lower price brackets was one of scepticism . . . However, we were willing to be shown, and ordered a UNITRON research phase-contrast model MPE, at $265 and found it completely satisfactory. Being further intrigued by the seemingly-impossible claims of this organization for their $99 model MPEA, we explored further and have been using this incredibly cheap instrument on cultures of living amoeba and paramecium, as well as on other materials, both fresh and stained. The results have been remarkable. Living protozoa are seen as never possible by ordinary bright-field; cellular details, as trichocysts, cilia, gullet, membranelles, appear as clearly or more so than on stained slides, and are seen in action in the living animal . . . Now, for the first time, this equipment, the most important development in light microscopy since oil-immersion objectives, is within the reach of the amateur, the high school, and the college freshman laboratory."

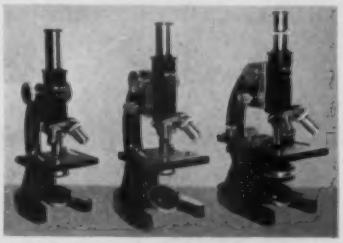
The Wall Street Journal also reported on the UNITRON Student Phase Microscope in its January 4 issue under the heading "Aids Budding Biologist". We like that title and think that our microscope does just that.

Research model within your budget

The advanced worker who needs oil immersion will be more interested in our research model MPE, which gives magnifications from 50-1500X. This comes complete *with* 3 objectives, 3 eyepieces, mechanical stage, etc. and *without* focusing telescope and substage turret changer. Readers who have used phase microscopes will recognize the "without" items as the curse of the conventional phase instrument in which it is necessary to align phase diaphragms with every change of objective. In UNITRON Model MPE, changing objectives merely involves adjusting the height of the substage condenser as indicated by a scale on the microscope stand. Furthermore, as the height of the condenser is varied, there is a *continuous* transition from bright field to phase contrast. The intermediate positions offer useful types of contrasts which contribute toward a complete picture of the specimen. The price of this complete instrument is only $265—less than *half* the cost of the *accessories* needed to adapt an equivalent bright field microscope for phase work.

Further details

There are four UNITRON Phase



Models (even a portable model), and our catalog sheet illustrates and describes them all. This informative literature also gives information on the *four contrasts* which are available, as well as details on applications of the phase microscope. If you are interested in the theoretical principles involved in the optical design of the new UNITRON Phase Microscopes, and the resulting advantages over the conventional phase microscopes, we'll be glad to include a technical bulletin on the subject. All of this literature is yours for the asking. We shall probably take advantage of the opportunity to enclose literature on some of our other new instruments, so if you are interested in microscopy, we think you will find it worth while to write for further information.

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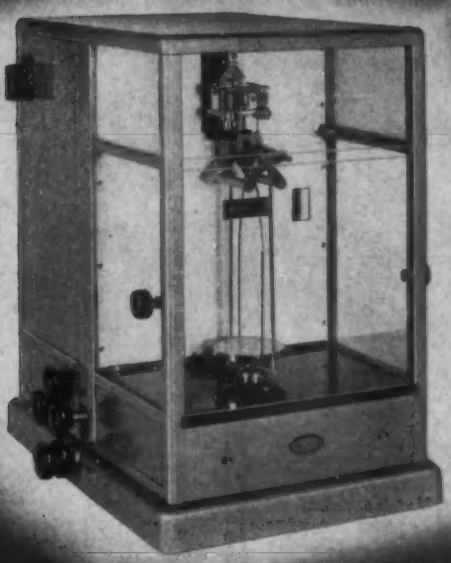

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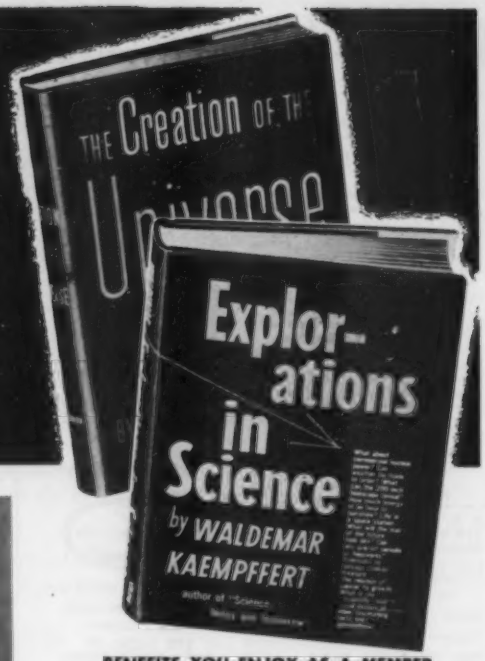

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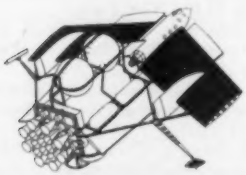

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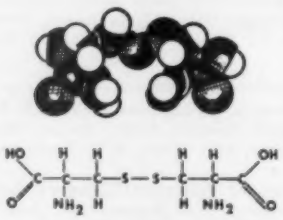

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15–19. National Assoc. of Corrosion Engineers, annual. Kansas City, Mo. (A. B. Campbell, 1061 M & M Bldg., Houston 2, Tex.)

16–17. Symposium on Monte Carlo Methods, Gainesville, Fla. (H. A. Meyer, Univ. of Florida, Gainesville.)

18. Inst. of Mathematical Statistics, Eastern regional, Gainesville, Fla. (H. A. Meyer, Univ. of Florida, Gainesville.)

18–20. American Physical Soc., Detroit and Ann Arbor, Mich. (K. K. Darrow, Columbia Univ., New York 27.)

21. International Assoc. for Dental Research, French Lick, Ind. (E. H. Hatton, 311 E. Chicago Ave., Chicago 11, Ill.)

22–24. American Assoc. of Dental Schools, annual, French Lick Springs, Ind. (M. W. McCrea, 42 S. Greene St., Baltimore, Md.)

22–25. Inst. of Radio Engineers, annual, New York City. (E. K. Gannett, 1 E. 79 St., New York.)

24–1. American Chemical Soc., 125th national, Kansas City, Mo. (R. M. Warren, 1155 16 St., NW, Washington, D.C.)

25–27. Alpha Epsilon Delta, 10th national, Bloomington, Ind. (M. L. Moore, 7 Brookside Circle, Bronxville, N.Y.)

25–27. Optical Soc. of America, spring, New York City. (A. C. Hardy, Massachusetts Institute of Technology, Cambridge 39.)

25–27. Symposium on the Origins of Resistance to Drugs, Washington, D.C. (M. G. Sevag, Dept. of Microbiology, School of Medicine, Univ. of Pennsylvania, Philadelphia 4.)

26–28. American Assoc. of Physical Anthropologists, annual, Yellow Springs, Ohio. (J. L. Angel, Jefferson Medical College, 307 S. 11 St., Philadelphia 7, Pa.)

April

1–2. American Heart Assoc., 30th annual, Chicago, Ill. (R. Betts, AHA, 44 E. 23 St., New York 10, N.Y.)

1–3. National Science Teachers Assoc., annual, Chicago, Ill. (R. H. Carleton, 1201 16 St., NW, Washington 6, D. C.)

2–3. American Assoc. of University Professors, Buffalo, N. Y. (R. E. Himstead, 1785 Massachusetts Ave., NW, Washington 6, D. C.)

3–10. Pan American Cong. of Veterinary Medicine, 2nd, São Paulo, Brazil. (J. S. Veiga, Rua Pires da Mota 159, São Paulo.)

5–8. Symposium on Orthopteran Acoustics, Jouy-en-Josas, France. (Laboratoire de Physiologie Acoustique, Institut National de la Recherche Agronomique, Jouy-en-Josas.)

5–10. International Sound-Recording Conf., Paris, France. (Société des Radio-electriciens, 10–14 Avenue Pierre-Larousse, Malakoff, France.)

5–11. Pan American Cong. on Agronomy, 2nd, São Paulo, Brazil. (J. Moraes, Escola Superior de Agricultura "Luiz de Queiroz," Piracicaba, Brazil.)

6–9. Conf. on the Physics of Particle Size Analysis, Nottingham, Eng. (Inst. of Physics, 47 Belgrave Square, London S.W. 1.)

7–9. American Assoc. of Anatomists, Galveston, Tex. (N. L. Hoerr, Western Reserve Univ. School of Medicine, 2109 Adelbert Rd., Cleveland 6, Ohio.)

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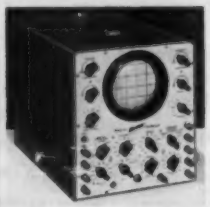

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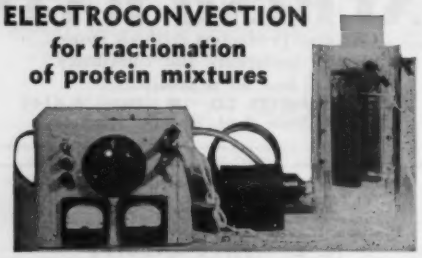

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